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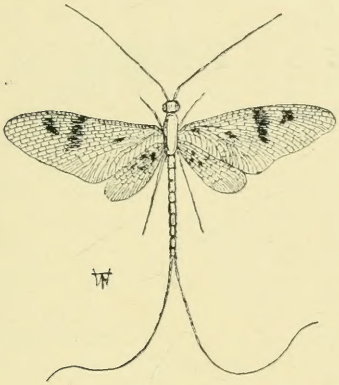
The Canadian Entomologist

VOLUME XXXV.



Ephemera simulans, Walk.

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LONDON, ONTARIO.

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London, Ontario:
The London Printing and Lithographing Company, Limited.

1903.

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WILLIAM E. SAUNDERS.

SECRETARY OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO FROM 1887.

The Canadian Entomologist.

VOL. XXXV. LONDON, JANUARY, 1903. No. 1

WILLIAM E. SAUNDERS.

In this issue of our magazine we have pleasure in presenting to our readers a portrait of the Secretary of the Entomological Society of Ontario for the last fifteen years, MR. W. E. SAUNDERS, who is well known as a prominent member of the fraternity of Canadian naturalists. Mr. Saunders's home is in London, where he was born and where most of his life has been spent. His father, Dr. William Saunders, Director of the Experimental Farms of the Dominion, has always been devoted to the study of the natural sciences, and hence the son's attention was in early years directed to similar pursuits, interest in them being maintained by the making of collections in the different departments. Geology, Botany, Entomology and Ornithology all in turn provided object-lessons for study, training the mind to habits of close observation and filling the leisure of later years with delightful employment.

After a few years of miscellaneous collecting, Mr. Saunders turned his attention more exclusively to Ornithology, and as soon as the use of a gun was permitted he commenced a scientifically-arranged collection of our native birds, showing male and female in summer and winter plumage, with any variations from the types: also the nest and eggs of each species. Year by year the collection is added to, until now it numbers over 1,000 specimens. Mr. Saunders's birds are his intimate friends, and whether in his own house or on the public platform, his "Bird Talks," illustrated with specimens, show to his audience that he speaks of what he has learnt by personal experience in the fields and woods. His enthusiasm for this study is such that he counts it no hardship to walk miles into the country in time to hear some favourite songster greet the dawn. He has also been known to spend a night in the woods in the depths of winter, just to see what he missed by spending his nights in bed!

About two years ago Mr. Saunders accompanied his father on an official visit to Sable Island, a place he had long wished to go to in order

to see the only known breeding place of the "Ipswich" sparrow. The impressions of this trip were given to the public in an article in one of our local papers, which has since been adapted for some of our scientific magazines. Mr. Saunders was able also to enrich his collection by several specimens of the rare sparrow, as well as some other beautiful birds which have their habitat on that interesting island.

Although Mr. Saunders is kept fully employed in looking after his business interests, he finds a change of work sufficient to afford him the rest he needs ; hence, he has employed his leisure time in many pursuits, and while Ornithology may be called his principal "hobby," he has gone rather extensively into gardening and horticulture generally—extensively, considering the size of his lot on Central Ave., but the amount of fruit and flowers there produced is a surprise and pleasure to all his summer visitors. His well-known love for these pursuits and his knowledge of horticulture generally has occasioned his recent election to the chairmanship of the committee who have in charge the care of the street trees in London.

Mr. Saunders received his education principally in London, though two or three years were spent in boys' colleges elsewhere. As it was considered best for him to enter the drug business so long conducted by his father, he was sent for two years to the Philadelphia College of Pharmacy, where he graduated with the highest honours. Soon after his return to London he was taken into partnership with his father, but on the latter being appointed Director of the Experimental Farms of the Dominion, Mr. Saunders retired from the retail business and entered into the wholesale exclusively.

On the establishment of the Western University he was appointed to the chair of Chemistry, which he held until the claims of his own business forced him to relinquish the position.

We regret to learn that the Entomological Society of Belgium has recently lost its venerable President, Dr. Pierre-Jules Tosquinet, retired Inspector General of the Health Department of the Army, Officer of the Order of Leopold, and honoured with the Civil Cross of the First Class and also the Military Cross. He died at Saint Gilles, October 28th, 1902, in the 78th year of his age.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 11.—Continued from Vol. XXXIV., p. 291.)

Family XXXIV.—Sapygidæ.

The wasps belonging to this family, on account of the emarginate eyes in the females, and the abdomen being usually marked with yellow or white, closely resembles those in the families *Myzinidæ* and *Scoliidæ*, but may be easily distinguished by the great difference in the legs, the middle coxæ being approximate, the outer face of the tibiæ being smooth, unarmed, *without* tubercles or spines, while the tarsi are without strong spines or bristles, and unfitted for digging.

The antennæ, too, are different; they are inserted much farther apart, being nearer to the eye margin than to each other. The pronotum is broader, abruptly truncate anteriorly, with the front angles more acute, while the venation, at least in the front wings, is wholly different from the venation in the *Myzinidæ* and the *Scoliidæ*, the stigma being distinct, never small, the marginal cell larger, lanceolate, the basal nervure slightly arcuate, with the cells different. The males are easily known by the *unarmed* hypopygium.

In habits the species agree with those in the *Trigonalidæ*, being parasitic in the nests of wasps and bees.

Table of Genera.

1. Head normal, *without* smooth, blister-like swellings along the inner margin of the eyes and on the vertex; ocelli large, distinct.....2.

   Head *with* smooth, blister-like swellings along the inner margin of the eyes and on the vertex; ocelli small, indistinct.

   Antennæ at apex similar in both sexes, the last joint in the male not enclosed by the penultimate..... (1) Eusapyga, Cresson. (Type E. rubripes, Cr.)

2. Antennæ dissimilar in the sexes, not filiform; mandibles with unequal teeth.....3.

   Antennæ similar in both sexes, filiform, tapering off at apex; mandibles broad, 3-dentate, the teeth blunt, equal; maxillary palpi 6-jointed, labial palpi 4-jointed.....(2) Polochrum, Spinola. (Type P. repanda, Spinola.)

3. Third joint of the antennæ *not* longer than the fourth; second cubital cell narrowed above; antennæ in female clavate, in male subfiliform, the last joint more or less enclosed by the penultimate; mandibles 3-dentate, the teeth acute, the outer tooth a little the longest.....(3) Sapyga, Latreille.
(Type Apis clavicornis, Fabr.)

Third joint of the antennæ longer than the fourth; second cubital cell not much narrowed above; antennæ in female subfiliform.....(4) Sapygina, Costa.
(Type Sapyga decemguttata, Jurine.)

Family XXXV.—Myzinidæ.

This family is usually classified with the *Scoliidæ*. According to my views, it is quite distinct, although closely allied, and is easily separated by the difference in the shape of the eyes in the females, and by the totally different armature of the male genitalia.

The eyes in a female Myzinid are always *entire*, never emarginate within, as in the *Scoliidæ* The males have the eyes emarginate or sinuate within, much as in the *Scoliidæ*, but are easily distinguished by difference in venation and by the armature of the genitalia, the tip of the abdomen always ending in a single upward curved aculeus.

In the *Scoliidæ* the abdomen in the males terminates in three straight spines.

The family is without doubt *parasitic*, but nothing seems to be known of the habits of the many species already described.

Many of our species are common in midsummer and early fall; they are conspicuous and easily observed, and some of our younger entomologists should make an effort toward unravelling their life-histories.

The genus *Menisus*, Du Buysson, I do not know; it may be Sapygid, but I am unable to place it from the description.

The species in our catalogues, under the genus *Myzine*, do not belong to it, but should be removed to the genus *Plesia*, Jurine.

Table of Genera.

1. Females: eyes entire, *not* emarginate within.....2.
Males: eyes more or less emarginate within.....11.
2. Wings fully developed, normal.....3.
Wings much abbreviated, the apex pointed, incised or bilobed.....9.

3. Front wings with *three* cubital cells, *rarely with two cubital cells* ..4.
Front wings with two cubital cells.
Second cubital cell receiving both recurrent nervures.....Poecilotiphia, Cameron.
(Type P. albomaculata, Cam.)

4. Marginal cell not at all or only slightly separated from the costa; *three* cubital cells, the second and third each receiving a recurrent nervure.....8.

Marginal cell widely separated from the costa, nearly to the stigma, and directed forward into the disc of the wing, so as to occupy the place usually occupied by the third cubital cell.
Two cubital cells.....5.
Three cubital cells.....6.

5. Thorax elongate, the pronotum long; hind tarsi twice longer than their tibiæ; cubitus in hind wings originating *before* the transverse median.....Hemimeria, Saussure.
(Type Myzine Savignyi, Guér.)

6. Second cubital cell neither small nor petiolate.....7.
Second cubital cell very small, longly petiolate; hind tarsi not twice longer than their tibiæ.....Myzine, Latreille.
= Tachus, Jurine.
= Meria, Illiger.
(Type Tiphia tripunctata, Rossi.)

7. Second cubital cell large, longer than wide, trapezoidal, receiving the recurrent nervure far beyond the middle; hind tarsi about twice as long as their tibiæ; cubitus in hind wings originating behind the transverse median nervure; mandibles long, sickel-shaped, edentate.....Plesia, Jurine.
(Type Tiphia namea, Fabr.)

Second cubital cell not so large, receiving the recurrent nervure at the middle; mandibles stout, curved, edentate..Dimorphoptera, Smith.
(Type D. scoliiformis, Smith.)

8. Cubitus in hind wings originating *beyond* the transverse median nervure; hind tibiæ elongate, triangulate; last joint of hind tarsi not smaller than the fourth..Micromeria (Westwood) Saunders.
(Type Meria, Llugii, Westwood.)

Cubitus in hind wings originating (?) *before* the transverse median nervure; hind tibiæ globose; last joint of hind tarsi very minute..... Parameria, Guérin.
(Type P. femorata, Guér.)

9. Wings glabrous, *not* hairy..... 10.
Wings hairy, strongly fimbriate.
Apical lobes of front wings unequal; stigma and veins absent..... Komarovia, Radoszkowski.
(Type K. victoriosa, Radoszk.)

10. Apex of wings bilobed, the marginal cell wanting; *one* cubital and *two* discoidal cells; mandibles at apex bifid; hind tibial spur moderate, straight and acute..... Pseudomeria, Saunders.
(Type P. graeca, Saund.)
Apex of wings pointed; *one* or *two* discoidal cells; mandibles at apex simple, edentate; hind tibial spur very long, slender, acute (Africa)..... Pseudotiphia, Ashm., g. nov.
(Type Tiphia brevipennis, Lucas.)

11. Front wings with *three* cubital cells..... 12.
Front wings with *two* cubital cells.
Second cubital cell receiving both recurrent nervures..... Poecilotiphia, Cameron.

12. Marginal cell at apex *not* at all or only slightly separated from the costa; second cubital cell large, irregularly quadrangular, trapezoidal or pentagonal, longer than the third..... 13.
Marginal cell at apex widely separated from the costa; second cubital cell small, longly petiolate..... Myzine, Latreille.

13. Marginal cell *shorter*, rounded or truncate at apex; second cubital cell long, in outline triangular..... 14.
Marginal cell long, its apex oblique and with a slight curve inwards *near* the costa; *three* cubital cells, the second cell large, the second and third each receiving a recurrent nervure, or the second recurrent is interstitial with the second transverse cubitus; cubitus in hind wings originating *before* the transverse median nervure..... Plesia, Jurine.

14. Apex of marginal cell narrowly rounded; second cubital cell receiving the first recurrent nervure *at* or a little before the middle, the second recurrent nervure received by the third cubital cell *before* the middle..... Micromeria, Saunders.

Apex of marginal cell briefly truncate; second and third cubital cells each receiving a recurrent nervure at or a little beyond the middle; cubitus in hind wings originating a little before the transverse median nervure.....Mesa, Saussure.
(Type M. diapherogamia, Sauss.)

FAMILY XXXVI.—Scoliidæ.

This family is very closely allied to the *Myzinidæ*, but may be easily separated by having the eyes in the females distinctly *emarginate* within. The males also have emarginate eyes, but are more easily distinguishable by abdominal peculiarities, the tip ending in *three* straight spines, but never in a single upward curved aculeus as in the *Myzinidæ*.

The species are parasitic upon the larvæ of beetles belonging to the family *Scarabaeidæ*, and probably also upon other ground-inhabiting beetle larvæ.

Two subfamilies may be recognized:

Front wings with only *one* recurrent nervure; if with two, the second recurrent is incompletely formed, and bends backwards so as to unite with the first, the second cubital cell receiving only one recurrent nervure.....Subfamily I.—Scoliinæ.

Front wings with two complete recurrent nervures, both of which are received by the second cubital cell..... Subfamily II.—Elidinæ.

SUBFAMILY I.—Scoliinæ.

In this subfamily the front wings have only a single complete recurrent nervure, which is received by the second cubital cell. The group is evidently an offshoot from the *Elidinæ*, which have two complete recurrent nervures.

Table of Genera.

1. Front wings with *four* discoidal cells, the third usually triangular, often petiolate.....2.

Front wings with *three* discoidal cells.

Two closed cubital cells.....Discolia, Saussure.
(Type Scolia apicicornis, Guér.)

Three closed cubital cells.....Scolia, Fabricius.
=Triscolia, Sauss.
=Triliacos, Sauss. (partim.)
(Type S. flavifrons, Fabr.)

2. *Two* cubital cells.....Diliacos, Sauss. et Sich.
(Type Compsomeris violacea, Lepels.)

Three cubital cells.....Liacos, Guérin.
= Triliacos, Sauss. et Sich (partim.)
(Type L. dimidiata, Guérin.)

SUBFAMILY II.—Elidinæ.

This subfamily is separated from the *Scoliinæ* by having two recurrent nervures, and both being received by the second cubital cell. It is the older type of the two subfamilies, and is clearly shown by the more numerous cells in the front wings.

The present conception of the genus *Elis* appears to be wrong. *Elis*, as established by Fabricius, was a most composite group, and some of the species originally placed in it by Fabricius did not even belong to the same family.

Fabricius, when he established *Elis*, placed under it *seven* species, viz.: (1) *E. sexcincta*, (2) *E. interrupta*, (3) *E. senilis*, (4) *E. 7-cincta*, (5) *E. cylindrica*, (6) *E. volvulus* and (7) *E. cochleata*. Subsequently, some of these were placed in other genera, and the first species, *Elis sexcincta*, became the type of the genus *Myzine*, Latr. After going carefully over the literature, I find that the only species left to which the Fabrician name *Elis* may be applied is *Elis (Scolia) 7-cincta*. This must now be considered the type of the genus; it will throw out the generic names, *Colpa*, Lep.; *Compsomeris*, Lep., and *Dielis*, Sauss., and what we have been calling *Elis* becomes *Trielis*, Saussure.

Table of Genera.

1. Front wings with *three* or *four* cubital cells.....2.
Front wings with *two* cubital cells.
Three discoidal cells..... Elis, Fabricius.
= Compsomeris, Lep.
= Colpa, Lepel.
= Dielis, Sauss.
(Type Scolia 7-cincta, Fabr.)

2. Front wings with *three* closed cubital cells.
Three discoidal cells.....Trielis, Saussure.
= Elis, Sauss. et Auc.
(Type Elis consanguinea, Sauss.)
Four discoidal cells.....Trisciloa, Gribode.
(Type T. Saussurei, Grib.)
Front wings with *four* closed cubital cells..Tetrascolia, Ashm., g. nov.
(Type Compsomeris Urvillii, Guér.)

NEW NOCTUIDS FOR 1903.—No. I.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, N. J.

Feralia Columbiana, n. sp.—Ground colour a bright emerald green, the maculation black and white. Head with a black interantennal spot. Collar with a black patch at its centre and at the base of each primary: tipped with whitish. Behind the collar there is a black edging to the disc and the loose basal tuftings are black marked. The edges of the patagia are black along the disc and at the base of the wings. The thorax itself is small and quadrate, the maculation just described forming a black square in its centre. The abdomen is deep smoky brown, yellowish or whitish at tip. Primaries with all the lines black, prominent, yet fragmentary. Basal line single, accompanied by a few white scales, becoming diffuse at the inner margin. T. a. line single, followed by a white line, outcurved as a whole and irregularly bent or curved outwardly in the interspaces. It may or may not be connected with the basal line by a black bar below the median vein. T. p. line very irregularly dentate, broad, a little diffuse outwardly, preceded by a white line, the tooth on vein 4 carrying the line nearest to the outer margin. The median shade line is irregular, broken, almost upright, coming between the ordinary spots and tending to become obsolete below the middle of the wing. If complete the tendency is to a black powdering through the outer half of the median space. There is no s. t. line. The space between t. p. line and outer margin is even to a series of large black, interspacial terminal spots which are preceded by white scales. Beyond these spots the fringes are cut with blackish, the intermediate spaces whitish. Orbicular round or oval, more or less completely outlined in white and black. Reniform large, upright, a little constricted in the middle, an inner, diffuse white line to the incomplete black defining line. Claviform indicated by black scales and more or less white filled. The secondaries may be entirely blackish with white fringes, or there may be a whitish margin and base of indefinite extent. Beneath with a geminate extra-median line on all wings; secondaries with a large black discal spot. The primaries have the terminal space green, but within that everything is more or less black powdered to the base. A large black patch on the costa between the outer line and the terminal space. The breast is a mass of smoky blackish long fine hair. The legs are banded and ringed with black, white and green.

Expands 40 mm. = 1.60 inches.

Habitat: New Westminster, British Columbia, 1896 (Fletcher); Northwest Territory (Ottolengui).

Two males in good condition, very much alike, yet different. The specimen from Dr. Fletcher came some years ago and was associated with *Momophana Comstocki*, because of the tendency to powder or darken the outer portion of the median space. It was realized that the wing form was somewhat different; but this was not without the range of possible variation, and I had an example from Oregon that I yet believe to be *Comstocki*. The receipt of a fine example from Dr. Ottolengui makes clear a close relationship to *Feralia jocosa*, than which it is a much larger and more intensely coloured form. It is quite likely that the secondaries may vary to almost whitish with more or less blackish powderings.

Carneades cinereopallidus, n. sp.—Ground colour a peculiar, very pale ashen gray, more or less powdered with bluish dark gray scales; a little washed locally with luteous. Head concolorous. Collar with a blackish line across the middle, below which is a whitish line or shade which may involve the entire lower half. Tip edged with white scales, then luteous to the black line. Thorax with disc and patagia more or less whitish, the edges of the latter sometimes edged with black: more evidently so in the females. Primaries whitish powdered over the costal region; a luteous shading through the cell and in the s. t. space. A black, geminate basal line is obscurely marked: most obvious on and below the median vein. Median lines practically lost: the t. a. marked by the claviform and a slight difference in shade between basal and median spaces; t. p. a narrow paler line which is somewhat rigidly oblique. S. t. line narrow, whitish, preceded by black scales which may form rather vague sagittate spots. It is obviously dented by whitish rays on veins 3 and 4, which do not, however, quite reach the outer margin. Whitish rays on veins 6 and 7 do not, or only slightly, dent the line. A series of smoky, obscure, terminal lunules. A very pale yellow line at base of fringes. Claviform narrowly outlined by black scales, concolorous, usually with a paler shading above and beyond it. Orbicular oblique, oblong, varying in width, open to the costa, sometimes outlined by black scales, of the palest ground colour or a little whitish. Reniform rather narrow, kidney-shaped, pale yellowish, sometimes contrasting; not outlined except by the rather sharp colour contrast. Secondaries white, with a very narrow smoky edging in the male, a broader, variable outer

shading in the female. Fringes white. Beneath, white with a smoky disc on primaries, costal region powdered on secondaries, a smoky terminal line on all wings.

Expands 28–33 mm. = 1.12–1.32 inches.

Habitat: Stockton, Utah, in October. Four examples, two of each sex, and none of them good, are at hand from Mr. George Franck.

The species belongs with the *4-dentata* series; but is not especially well marked and recalls the *personata* form of *pityochrous*. It is best placed near *4-dentata*, and I am not sure that some specimens so marked will not prove referable to this new form.

The antennæ of the male have the lateral processes well marked and the bristle tufting long.

Carneades tronellus, n. sp.—Ground colour white with a yellowish tinge, ranging from faint lemon to creamy or even very pale luteous; the deeper shades in the females. Head and thorax concolorous, vestiture rather thin, long, patagia not marked. Primaries, in the males almost immaculate, the only obvious mark being a somewhat diffuse blackish spot at the end of the cell, representing the reniform. On close examination, scattered darker scales or slight shadings indicate the maculation which is obvious in the female. In the latter sex the primaries are more or less powdery and all the normal maculation is traceable, albeit in a fragmentary fashion, nor all of it in any one specimen. Basal line marked by black scales on costa and median vein. T. a. line geminate, the inner line is usually marked on the costa only, broken into imperfect interspacial lunules, as a whole a little outcurved. T. p. line geminate, inner line narrow, broken, feebly crenulated, blackish, outer line a vague shading: the course as a whole well curved over the cell and a little incurved below. A dusky costal patch in the s. t. space contrasts a little with the somewhat paler apex. Terminal space a little dusky and thus indicating a somewhat irregular terminal line. Secondaries white in both sexes, in the female with a faint trace of narrow extra-median line. Beneath white, primaries with a yellowish tint, practically immaculate in both sexes.

Expands 32–37 mm. = 1.28–1.50 inches.

Habitat: Stockton, Utah, in October. Three ♂ and three ♀, all more or less rubbed or otherwise imperfect, from Mr. George Franck.

The species is allied to *citricolor*, Grt., but is much lighter in colour and in the ♂ not nearly so well marked. On the other hand, in the

female the maculation is much better written. So great a difference between the sexes is not usual in this series, and I believe that more material will bring maculate males and more nearly immaculate females.

Mamestra orida, n. sp.—Ground colour ashen gray, powdered with black. Head inferiorly protuberant, a little roughened, yellowish in colour. Vague blackish lines across the front and vertex. Collar inferiorly a little paler; a more or less obvious black transverse line. Thorax powdery, patagia with obscure submarginal lines. Primaries powdery, the maculation obscure, except that the reniform and the s. t. line are always conspicuous. Basal line geminate, smoky, well marked; connected with base by a short black line in the submedian interspace. T. a. line marked by geminate blackish dots on costa and then lost. T. p. line also marked by costal spots and in some specimens by venular black dots, never complete. S. t. line whitish, irregular, with small outward teeth on veins 3 and 4, emphasized by the darker terminal space and a dusky preceding shade. A series of black terminal interspacial lunules. Fringes white at base, interlined with smoky, cut with paler on the veins, edges a little notch. Veins marked by blackish scales. Claviform broad, varying in length, outlined by blackish scales, concolorous. Orbicular rather small, oval, somewhat elongate, outlined in smoky brown, annulate with yellowish, smoky centered. Reniform large, kidney-shaped somewhat dilated inferiorly, and there obscured by a blackish, diffuse shading. Secondaries white, with a broad black outer margin, the fringes white. Beneath white, more or less powdery over the costal region. All wings with a broad, black submarginal band, and within this a series of black venular dots. Primaries with a discal lunule, secondaries with a discal dot. Tarsi annulate with black and white.

Expands 30–33 mm. = 1.20 to 1.32 inches.

Habitat: Stockton, Utah, in October.

Two ♂ and seven ♀ from Mr. George Franck, who has others which do not materially differ from the series under observation. The antennæ of the male have the joints a little marked, and are obviously ciliated. The genitalia are quite unique, and do not closely resemble those of any of the species figured by me in the revision.

It belongs to the group *defessa*, and may be most nearly associated with *chartaria*, differing obviously in the black-margined secondaries. The maculation of the under side is quite characteristic, and in all this species should be readily recognizable.

The protuberant, roughened front is somewhat unusual in this genus, but is not so marked as to require a separate generic term.

Caradrina drasteroides, n. sp.—Ground colour a creamy gray, with the yellowish tinge well marked. Head and thorax immaculate. Primaries powdered with black scales, which gives the gray tinge an emphasis; most of the s. t. and terminal spaces distinctly and evenly gray. The ordinary lines are not well marked. Basal line marked on costa only or not at all. T. a. line barely traceable by the absence of black scales; outwardly bent on the median vein, inwardly angled on the submedian. T. p. line better defined, geminate, only a little outcurved; inner line blackish or brown, sometimes emphasized on the veins; the outer line marked only by the darker s. t. space which relieves the pale shade following the inner dusky line. The median shade line is smoky or deeper luteous, well removed outwardly, and outwardly diffuse to the t. p. line. S. t. line whitish, almost even, a little better defined on the costa by a slight darkening in the s. t. space; well defined inwardly, somewhat diffuse outwardly. A series of minute black terminal dots, which may be wanting. Orbicular and claviform wanting. Reniform oblique, without definite outlines, dusky, obscured by the median shade, which crosses and completely involves it. Secondaries snowy white, with or without a small dark discal spot and a more or less obvious powdering of black scales at the base of the fringes. Beneath, primaries creamy white, the yellow most obvious along the costa, with a more or less obvious extra-median dusky line, and with or without a discal spot. Secondaries white, more or less creamy and powdery along the costa; a partial outer line and sometimes a small discal dot.

Expands 27–31 mm. = 1.08–1.24 inches.

Habitat: Southern California; Arizona. Two male examples; one in good, the other in fair condition.

The smaller specimen is from Arizona, and comes from the collection of Dr. Ottolengui. The larger specimen is from Southern California, and has been in my collection nearly or quite ten years awaiting a mate. The reference to *Caradrina* is not quite satisfactory, because of the wing form. This resembles more that of *Drasteria*, and there I expected at first to place it, but the species is obviously a typical trifid.

The vestiture is scaly, just a little roughened, forming no tufts of any kind. The palpi hardly exceed the front. The antennæ are very shortly ciliated.

Siavana rigida, n. sp. Ground colour a somewhat yellowish brick red, through which a luteous base appears locally. Head and collar a deeper, more rusty red-brown. Thorax and abdomen otherwise immaculate, concolorous. Primaries without strong contrasts. The costa is a deeper red-brown, and in the costal area there is a light gray powdering. T. a. line single, very slender, slightly irregular, a little outcurved, bright red-brown, tending to disappear altogether. T. p. line slender, crenulate, single, with or without minute black venular dots; as a whole, nearly parallel with the outer margin. S. t. line a series of vague gray venular dots, which may be altogether wanting. The colour deepens a little, and becomes somewhat smoky at the outer margin, where a narrow yellow line marks the base of the fringes. Median shade line crimson red, rigidly oblique from the costa near the inception of t. p. line, touching the lower outer angle of the reniform and reaching the inner margin just within the t. p. line. This line tends to disappear and may be entirely absent, and there may or may not be a prominent black patch on the inner margin, filling the space between the t. p. line and median shade line. Orbicular a small blackish dot. Reniform moderate in size, rather narrow, slightly oblique, somewhat constricted centrally, narrowly brown ringed, the filling luteous, but not contrasting. Secondaries a little paler at base than primaries, but darkening outwardly to the same shade. The median shade of primaries is obviously continued across the secondaries, and the t. p. line is vaguely traceable. There is also a slightly-waved, narrow, yellowish line at the base of the fringes. Beneath there is a crimson powdering, which becomes paler along the inner margin of the secondaries. A vague, common outer line.

Expands 45 mm. =1.80 inches.

Habitat: Huachuca Mts., Arizona. One male and one female from Dr. Barnes.

The species resembles the eastern *repanda* (*Harveya auripennis*, Grt.) in general appearance and in colour. In the ♂ the antennæ in the new species are decidedly more slender and the ciliation of the joints, though longer, is more sparse. So in *rigida* the apex is marked and the outer margin is a little excavated below it: in *repanda* the apex is obtuse and the outer margin is rounded. In the older species the median shade line is smoky, somewhat diffuse, and a little sinuate, almost parallel with the t. p. line; in the new species this line is rigid and crimson. Altogether, the differences, though not striking, seem to authorize the new species.

ARCTIC SIRICOIDEA AND TENTHREDINOIDEA.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The knowledge of our Arctic insect fauna is of so fragmentary a character that any contribution thereto is of special interest and value to Canadian entomologists. I am indebted to Dr. Hans Kiaer, of the Museum of Tromso, Norway, for a copy of an exceedingly valuable catalogue entitled " Die Arktischen Tenthrediniden,"* an examination of which emphasizes this fact. His introduction points out that in Canada little is known of the forms occurring north of St. Martin's Falls, Lat. 51°, whereas in Norway species are recorded from as far north as Lat. 70°. Of 228 species enumerated (including 12 of Siricoidea) Arctic Scandinavia furnishes 132, Nova Zemlya 18, Spitzbergen 6, Iceland 3, Greenland 2, Hudson's Bay region 59, Alaska 8, and Arctic Siberia 11. There is but one species common to Europe and America, and only 11 species in all occur in any two of the above regions, showing that the circumpolar fauna is not so cosmopolitan as is frequently supposed, although undoubtedly some forms now listed as distinct species may prove to be synonyms. *Rhogogastera viridis*, Linn., is the sole link between the old and new worlds. *Sirex bizonatus*, Steph., and *S. caudatus*, Cress., are found in Hudson's Bay territory and in Alaska : *Cimbex femorata*, Zett., *Trichiosoma lucorum*, Linn., and *Nematus miliaris*, Panz., in Arctic Scandinavia and Siberia ; *N. arcticus*, Holmgr., and *N. frigidus*, Boh., in Nova Zemlya and Spitzbergen ; *N. conductus*, Ruthe, and *Emphytus pallidipes*, Spin., in Arctic Norway and Iceland, and *N. obscuripes*, Holmgr., in Arctic Norway and Nova Zemlya. The percentage of Nematids to other forms is very large in the boreal and arctic faunas, and, apparently, increasingly so northward concurrently with changes in the flora. From the Hudson's Bay region this group is as yet not nearly

*FAUNA ARCTICA. Eine Zusammenstellung der arktischen Tierformen, mit besonderer Berucksichtigung des Spitzbergen-Gebietes auf Grund der Ergebnisse der Deutschen Expedition in das Nordlicher Eismeer im Jahre, 1898. Band II., Lieferung 3, 1902.

so well represented as is that of the Tenthredinids, clearly showing that the smaller and inconspicuous forms characteristic of the north have escaped the attention of the few collectors there, and that extensive additions could be made to the list of species, did not the inaccessibility of the region at present prevent systematic collecting.

A notable addition has been made to the knowledge of American species, since the preparation of Kiaer's catalogue, in the "Papers from the Harriman Alaska Expedition" (Proc. Wash. Acad. Sciences). No. XXVIII. (158 pages, 3 plates) is a monograph by Ashmead of all the Hymenoptera,describing 201 new species and enumerating 335 species now known from Alaska. No. VII., by Prof. Kincaid, deals specially with the Tenthredinoidea. This large and successful expedition to Alaska was in 1899, and Prof. Kincaid, as entomologist, made, during the months of June and July, very extensive collections. Among these were 56 species of sawflies, of which 32 were new species described in his paper. The list of Alaskan species was thus raised in one brief season from 7 species to 61 species, and the fauna was shown to be comparatively rich. Many of the species found on the Alaskan coast will undoubtedly extend eastward into Canada, through the Yukon. The Tenthredinids are represented by 22 species, of which 6 are new, and the Nematids by 27, of which no less than 21 are new, an indication of how little was previously known, and of how much remains to be learned. Some of the species have a very extensive range, as, for instance, *Pœcilostomidea maculata*, Nort., the well-known strawberry sawfly; *Dolerus scriceus*, Say; *D. aprilis*, Nort.; *Cimbex americana*, Leach, and *Trichiosoma triangulum*, Cr., all of which occur throughout Canada and over large areas in the United States. It is stated that an especially rich series of Nematids may be expected in the Alaskan region "owing to the immense abundance, both in species and individuals, of various kinds of willows." This will hold good in a great measure all across northern Canada, and insects which feed upon birch, spruce and other widely-distributed northern plants can also have an extended range. This is shown by the occurrence in Alaska of *Pachynematus ocreatus*, Harrgtn., described from Ottawa, and bred from a larva on spruce. One of the few species previously known from Alaska, *Tenthredo melanosoma*, Harrgtn., seems to be abundant, as seven specimens were collected, and I have also received two males and two females from Mr. W. Simpson, of Ottawa, who collected them, in 1894, at Burroughs Bay.

THE LIFE-HISTORY OF *CROCIGRAPHA NORMANI*, GRT.

BY ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

On the 6th May, 1901, a cluster of 30 eggs of *Crocigrapha Normani*, Grt., was found by the writer. Six of these had been destroyed and the contents eaten, probably by some hemipterous insect. The eggs were laid in rows close together, touching each other, on the upper side of a leaf of *Caulophyllum thalictroides*, Michx., and formed almost a complete square, an average of six eggs being in each row. They looked as if they had just been laid. Young maple, ash and birch trees were growing near by.

Egg.—Almost semispheroidal; 0.7 mm. wide, 0.6 mm. high, about 31 ribs rising from almost near the base, which is flattened and pitted, making it appear roughened. The whole egg has a shiny appearance, particularly so towards and at the tip of each rib. The ribs are acutely angled, and the whole surface, except the base, is distinctly marked with wavy, transverse ribs. When found, the eggs were white. On the 7th May they were all ringed near the apex with reddish brown, and there was also a blotch of this colour near the apex. The eggs hatched on the 11th May.

Stage I.—Length, at first, 3.25 mm. Head 0.4 mm. wide, pale brown, slightly bilobed, with a shallow furrow down the front; mouth-parts reddish; hairs on face pale. Body cylindrical, pale yellow; after feeding, the food contents give a greenish appearance; skin smooth, shiny. The cervical shield is concolorous with head, and bears two rows of transverse tubercles, 4 large ones in front and 4 smaller ones behind. Tubercles on body shiny black, large, single-haired; tubercles i and iii in a line, ii and iv almost in a line, but iv nearer to iii than ii is to i. Spiracles very minute, faintly black, and in a line with tubercle iv, and about the same distance from tubercle iii as from iv; setæ short and black. A faint dark green dorsal vessel is apparent. All the feet are concolorous, slightly darkened at tips. The first two pairs of abdominal feet on segments 7 and 8 are aborted, only being about half formed.

The young larvæ are "loopers," and spin a considerable quantity of silk; when disturbed on a leaf, they rise up on their prolegs and assume a sphinx-like attitude. Apple, beech, willow, elm, basswood, wild gooseberry, ash, plantain, birch and wild cherry were offered, and while they fed on nearly every one of these plants, elm and beech were the favourite food.

On the 15th May most of the larvæ were swollen and ready for the first moult; on the 16th and 17th they cast their skins.

Stage II.—Length, 5.5 mm. Head 0.7 mm. wide, brownish yellow; on each cheek there are two large dark brown round spots. In some specimens these two spots are almost black, and the whole face is sparsely mottled with small spots of the same colour; ocelli dark; mouth-parts reddish; antennæ faintly reddish. There is now a great difference between the larvæ in this stage and in last stage. A distinct white dorsal stripe is now present, also a lateral stripe of the same colour, and a wide stigmatal band, which is double on some segments. The whole dorsal surface of the larvæ, just after moulting and for a day or so, is dark green, but afterwards becomes less dark in colour, the skin below spiracles being still paler. In some specimens the skin between the lateral stripe and the stigmatal band is quite dark, almost black. The cervical shield is concolorous with body. The feet are all pale green, the first pair of abdominal prolegs aborted. The thoracic feet bear black plates exteriorly.

On the 19th May several were swollen, and by the morning of the 20th four had moulted. The remaining specimens had all moulted by the 21st.

Stage III.—Length, 10 mm. The general appearance of the larvæ in this stage is much the same as just after last moult. Head 1.0 to 1.1 mm. wide, slightly bilobed, the two spots, one on each cheek, in all but a few specimens are now joined together, and appear as one large conspicuous mark shaped like a dumb-bell. The face is shiny and of the same brownish yellow as before; the brownish blotches, as in last stage, are also present over the whole face; ocelli black; mandibles reddish. Body of a rather geometrid appearance, colour above spiracles dark grayish green, below spiracles lighter green. The dorsal and lateral stripes are faintly bluish. The tubercles are black and very small. The stigmatal band now appears as a double stripe, joined together at the junction of each segment, and resembles a chain of links. The space between the double stigmatal stripe and the lateral stripe is darker than the dorsal area, and in some specimens this space is almost black, giving the appearance of a wide, black, lateral band. The spiracles are pale, ringed with black. Cervical shield concolorous with body. Thoracic feet and prolegs concolorous with venter, bearing short pale hairs. Claspers of abdominal and anal feet reddish. The first two pairs

of abdominal feet are fully formed in this stage, and are used by the larvæ when walking. Thoracic feet blackish at tips; abdominal feet shaded with black towards base. The larvæ do not change during this stage, and remain the same colour as just after moulting. They still have the habit of assuming the sphinx-like attitude.

On the 23rd May some specimens were swollen, and by the 25th all but four had moulted. These passed the third moult soon afterwards.

Stage IV.—Length, 17 mm. Head 1.5 to 1.6 mm. wide, very slightly bilobed. The larvæ in this stage do not show any difference from the last stage. The markings are exactly the same, no change whatever could be detected. The dorsal area is perhaps a little darker than in Stage III.

On the 27th May four specimens were swollen, and these had moulted by the morning of the 28th. The remaining larvæ moulted during the next two days.

Stage V.—Length, 21 mm. Head 2.0 to 2.2 mm. wide. In this stage also the larvæ do not show any material difference from Stage III. The whole dorsal surface is rather darker, and, in consequence, the black band on the sides does not appear so conspicuous. The whole skin above the spiracles is a dull-grayish green, finely mottled with black. The lateral stripe is fainter than before. The centre of the spiracle is pale orange in this stage, but ringed, as before, with black.

On the 31st May two larvæ passed the fifth moult, and the remaining specimens within the next few days.

Stage VI.—Length, 27 mm. The larvæ in this stage are very different from the last three stages. Head 3.1 to 3.4 mm. wide, brownish, very slightly bilobed, shiny; almost the whole upper surface of each cheek consists of one large, black, elongated spot. Between the two large spots the face is darker brown than the lower front of head, and is reticulated with the same colour. On the lower front and sides there are also some darker brown blotches; ocelli black; setæ pale and slender; at base of each hair there is a small dark brown spot. The head in the last three stages becomes darker with each moult. Body cylindrical; dorsal and lateral stripes, as well as the black band between lateral stripe and spiracles, are very faint now, the dorsal stripe being the most perceptible. The whole skin above the spiracles is now one mass of beautiful, small, wavy, black dashes, spots and blotches, the skin itself being of a dull yellowish gray, a pale reddish brown, or a dull grayish

green, the shade varying in almost each larva. Superficially, however, the colour is much the same, and does not vary to a striking extent. On all the specimens there is a distinct purplish or reddish sheen between the segments. The venter in all the specimens is paler than the dorsum. Cervical shield darker than body. Tubercles small, black, normal; setæ pale and slender. Tubercle iv behind the spiracle. Spiracles black, with a pale centre. Feet concolorous with venter; thoracic feet shiny; claspers of prolegs blackish.

Length of mature larva at rest, 35 mm.; extended, 42 mm.; width at widest part, 5.75 mm.

On the 13th June four larvæ buried, on the 14th two, on the 16th two, and the remaining specimens soon afterwards. Pupation takes place within an earthen cell.

Pupa.—Average length, 17 mm.; width, 5.5 mm.; colour almost a warm sepia brown, polished; thorax, wing-cases, etc., finely wrinkled with transverse lines; abdomen polished, the segments pitted anteriorly. Cremaster stout, darker than abdomen, rugose, excavated beneath, with two slender straight spines, about 0.7 mm. in length, at the tip. These spines are pointed downwards, and are distinctly curved at the end.

The first moth emerged (in a cool cellar) on the 17th Feb., 1902, and four other specimens emerged on the 12th May, which is the natural time for the imago to appear (Ottawa, April 29, May 4, 7, 10, 21, 23, 25, 29, Fletcher, Young, Gibson; Toronto, Ont., May 9, 17, Gibson; Trenton, Ont., May 24, Fletcher; Chats Rapids, Que., May 24, Gibson).

On the 25th May, 1901, two larvæ of this species were found on the common Beaked Hazelnut (*Corylus rostrata*, Ait.) on the Experimental Farm, and had only emerged from the egg a few days. These were reared to maturity (the larvæ being fed solely on this plant), and the caterpillars answered well to those described above, the only apparent difference being that in Stage I the cervical shield was partly margined with black.

THE OCCURRENCE OF THE PHORID GENUS *ÆNIGMATIAS* IN AMERICA.

BY D. W. COQUILLETT, WASHINGTON, D. C.

The occurrence in Arizona of a representative of a very anomalous wingless genus of Phoridæ, of which but a single specimen was heretofore known, and that found beneath a stone in such a widely-separated locality as Denmark, is a problem in geographical distribution very difficult of solution. During the entomological excursion of Messrs. E.

A. Schwarz and H. S. Barber to portions of New Mexico and Arizona in the summer of 1901, while collecting at the base of a hill at Flagstaff, Arizona, Mr. Barber obtained in his sweeping net a single specimen of the cockroach-like genus *Aenigmatias*. This specimen agrees closely with Dr. Meinert's original description and figures of his *Aenigmatias blattoides**, except that it has only six instead of seven body-segments, not counting the genitalia. Thinking that perhaps an error had been made by the engraver, and that the description had been made conformable to the engraved figure, I addressed a letter on the subject to Dr. Meinert, who, under date of November 18, 1902, writes me that, in company with his assistant, Mr. Boving, he again examined the unique specimen and found that his published figures and descriptions are correct, and that the specimen really has seven distinct body-segments. In the genus *Phora* the male has normally six abdominal segments, while in the females of the various species the number ranges from four to six, according to the species. Dr. Meinert does not state the sex of his specimen, but the figures apparently indicate a male, although Prof. Mik has expressed the opinion that they probably represent the female, and that the winged *Platyphora Lubbocki*, Verrall, may be the male of the same species. The Arizona specimen also appears to be a male, and in addition to the fewer number of segments in the abdomen, possesses several minor differences, which indicate that it is specifically distinct from the Danish species.

Of its habits nothing is known beyond the fact that it occurred on low vegetation in a locality where no ant-nests could be found, although search was made for them. No stones nor rocks occurred in the immediate vicinity, the nearest approach being the small pieces of lava scattered about, but these were too small to conceal an ant-nest.

The new form may be characterized as follows:

Aenigmatias Schwarzii, new species.

Dark yellow, the posterior part of the body-segments brown, most extended on the apical part of the abdomen, where it covers the genitalia and the greater portion of the last two segments; upper side of body opaque, distinctly whitish pruinose, and with a short, sparse, yellowish-white pubescence, a row of short black bristles along the hind margin of each abdominal segment and a few shorter ones scattered over the last two segments; first thoracic segment (which comprises the prothorax and

*Entomologiske Meddelelser II., page 213, plate IV., figs. 1 to 6.

mesothorax) slightly over twice as long as the second, the latter almost twice as long as the first abdominal segment and subequal to the second; about two-thirds as long as the third, the fourth segment deeply emarginate in the middle, at which point it is slightly shorter than the first abdominal segment; greatest vertical diameter of abdomen scarcely more than that of the thorax, venter convex (and without the blackish protuberance shown in Dr. Meinert's figure 2); head sparsely clothed with a short yellowish-white pubescence, a row of black postocular bristles extends from upper end of each eye to the oral margin, apices of palpi beset with a dense cluster of black bristles; legs beset with short, black, bristly hairs, femora very robust; length, 1.5 mm.

Collected July 5, 1901, at Flagstaff, Arizona, by Mr. H. S. Barber, at whose request the species is dedicated to Mr. E. A. Schwarz, whose careful investigations have brought to light so many rare and interesting forms in all orders of insects. Type No. 6703, U. S. National Museum.

NOTES ON THE COCCIDÆ.

BY MRS. C. H. FERNALD, AMHERST, MASS.

In an article on the genus Lecanium, published in the CANADIAN ENTOMOLOGIST, Vol. 34, p. 177 (1902), I stated that I inferred that Costa proposed generic names for the Coccidæ in his Prospetto di una nuova descrizione metodica del genera Coccus L., a work I had not seen at that time, as no copy could be found in the libraries of this country or in London. Mr. Fernald has, however, recently secured a copy of this exceedingly rare work, published in 1828, from Naples, Italy.

Costa in his Prospetto published in 1828 proposed and described three genera. These were *Calymmata*, *Diaspis* and *Diaprosteci*. As this last is only a vernacular name, it need not be considered, although the author gave *Coccus adonidum*, L., as an illustration. *Calymmata* was divided into Monaspidæ and Polyaspidæ. Under this genus the author mentioned several species as illustrations. The genus *Diaspis* was described, but as no species were mentioned or referred to, it is without a type so far as the Prospetto is concerned. There is therefore nothing in this work to affect the classification of the Coccidæ.

In his Nuove Osservazioni intorno alle Cocciniglie, published in 1835, Costa used *Calypticus hesperidum* in some places and *Calymmatus hesperidum* in others, while he used *Dactylopius* instead of *Diaprosteci* of the Prospetto. In the Fauna del Regno di Napoli, he divided the Coccidæ into three genera, *Calypticus*, *Dactylopius* and *Diaspis*, each of which was described and with well-known and fairly well described species under them.

CASSIDA VIRIDIS, LINNEUS.

In the October number of the CANADIAN ENTOMOLOGIST, I told of the appearance at Levis of a tortoise-beetle new to this Province.

A question as to the identity of this insect having been raised, I asked Professor E. A. Popenoe, of Kansas State Agricultural College (to whom I was sending specimens), for his opinion upon it. I also sent specimens to the Coleopterist of the British Museum, with a like request. Both gentlemen very kindly answered me.

Mr. Popenoe wrote: "In Redtenbacher's Fauna Austriaca, the only general European work on the species within my reach, there is a very good analytical table and fairly full descriptions of the species within the limits of the work, and I find your specimens to agree with his description of *Cassida equestris*, Fab., of which he places *C. viridis*, L., as a synonym. I am satisfied that your determination is correct. Redt. says the margin of the abdomen is yellow, and it is so in one of your specimens, though not distinctly so in the other."

Mr. Chas. O. Waterhouse replied: "I have carefully examined the Cassida you sent me, and I am sure it is our common thistle species, *Cassida viridis*, L."

I am glad to find that my reading and my early recollections of the English insect did not mislead me.

In *Illustrations of the Linnean Genera of Insects*, by W. Wood, Vol. I., there is a coloured representation of *C. viridis*, and in the Rev. J. G. Wood's *Insects at Home*, Fig. xxiii., the insect is shown in its different stages.

C. viridis, like the fly, *Pegomyia bicolor*, and the moth, *Metzneria lappella*, was probably brought out in supplies of fodder for cattle sent to this country.—THOMAS W. FYLES, Levis, P. Que.

BOOK NOTICE.

A NATURAL HISTORY OF THE BRITISH LEPIDOPTERA, VOL. III.—By J. W. Tutt, F. E. S. Demy 8 vo, 558 + xii. pp. Price, £1 net. Swan, Sonnenschein & Co., Paternoster Square, London, E. C.

The third volume of Tutt's *British Lepidoptera* has appeared, and is fully up to the standard of the first two volumes. The superfamily *Lachneides* is completed, the superfamilies *Dimorphides (Endromides)*, *Attacides* and a part of the superfamily *Sphingides* are finished.

The references to literature, ancient and modern, seem to leave nothing more to be desired in this respect ; in fact, the amount of labour performed and research that has been made seems almost appalling, and we wonder whether the author has the strength and endurance to carry such an undertaking through to completion.

This work may well be taken as a model by one who is less experienced, provided he does not follow it too closely and thus destroy his own originality of thought and plan.

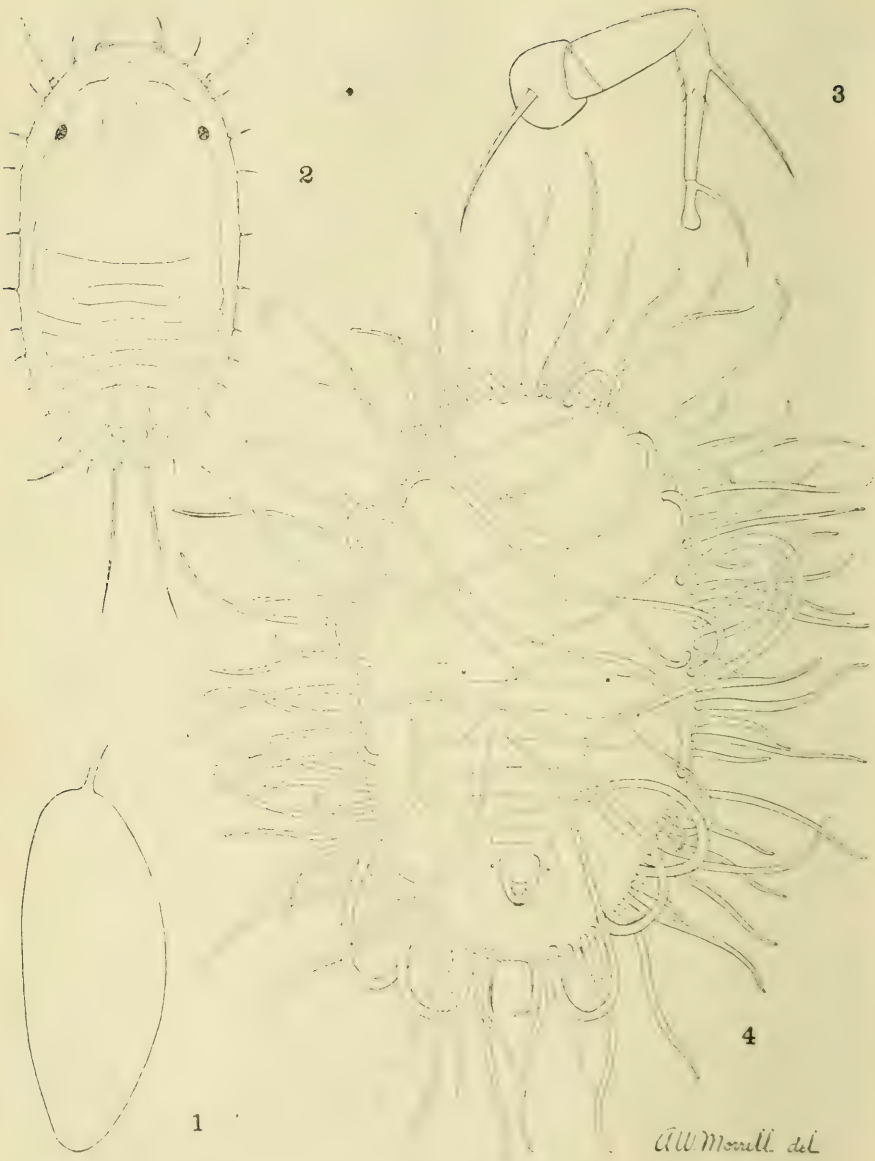
Under each superfamily is given a very complete history of the classifications of the different authors. These are carefully discussed, and when the author differs from others, he does not hesitate to express his convictions.

Many of our old familiar names have disappeared, and are to be found only among the tail-feathers of synonymy. This is, however, strictly in accordance with the law of priority, and if any of us feel unreconciled to this, we may well ask ourselves whether we are to keep up with the trend of modern scientific thought or fall by the way.

Under each species is given the synonymy and references to literature, so full and complete that we can hardly imagine anything of importance to have been overlooked. Then follows the original description in the language in which it was published, and this is followed by the author's description of the imago. There is then given a full account of sexual dimorphism and gynandromorphism, more than five pages being devoted to gynandromorphous examples of *Amorpha populi*, L. Variation is also taken up very fully with all the forms described and named, and this requires seven pages for *A. populi* alone. A complete account is given of the time, place and manner in which the eggs are laid, followed by a full description of the egg, the larva in each "stadium," and variations of the larva, pupation and cocoon, pupa, food-plants, parasites, habitats, time and place of appearance and distribution.

While this work must prove indispensable to the entomologist who desires full information on the Lepidoptera of the British Isles, it will be exceedingly valuable to students of the Lepidoptera in the United States and elsewhere, because of the exhaustive study of the literature of the genera and higher groups, and the careful and conscientious manner in which the author applies the laws of nomenclature.—C. H. Fernald.

Mailed January 5th, 1903.



THE STRAWBERRY ALEYRODES (A. PACKARDI, N. SP.).

The Canadian Entomologist.

VOL. XXXV. LONDON, FEBRUARY, 1903. No. 2

LIFE-HISTORY AND DESCRIPTION OF THE STRAWBERRY ALEYRODES, ALEYRODES PACKARDI, N. SP.

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This species has hitherto been considered identical with *Aleyrodes vaporariorum*, the common greenhouse Aleyrodes of the tomato, cucumber, etc. A critical study of all the stages of both the greenhouse Aleyrodes and the strawberry Aleyrodes, made at the Entomological Laboratory of the Massachusetts Agricultural College, has resulted in finding structural differences between the two species in all the stages, except the egg and adult. These differences may be tabulated as follows:

	A. vaporariorum, Westw.	A. Packardi, n. sp.
1st instar.	18 pairs of marginal spines.	16 pairs of marginal spines.
2nd instar.	1st and 3rd pairs of dorsal spines well developed, though variable in length.	All three pairs of dorsal spines minute.
3rd instar.	1st and 3rd pairs of dorsal spines well developed, though variable in length.	All three pairs of dorsal spines minute.
Pupa.	3rd pair of dorsal spines well developed, though variable in length. 5–18 (usually 8) wax rods arising well up on the dorsum in addition to a double submarginal series of wax rods.	All three pairs of dorsal spines minute; only a double submarginal series of wax rods present.

In the above table the spines on the cephalic region of the dorsum are designated as the *first* dorsal pair; those on the sides of the first or third (first instar) abdominal segment as the *second* dorsal pair: and those which occur one on each side of the vasiform orifice the *third* dorsal pair. (In the reproduction of the drawings the second pair of dorsal

spines of the first instar and the first pair of dorsal spines of the pupa were, unfortunately, omitted, see plate 2.)

I have never seen an *Aleyrodes vaporariorum* on a strawberry plant out of doors. Specimens of Aleyrodes from Kentucky were recently received through Prof. C. H. Fernald from Prof. Garman on strawberry leaves, and were found to be identical with the common strawberry Aleyrodes of this locality. Experiments thus far have shown that *Aleyrodes vaporariorum* when transferred in the first instar to a strawberry plant will live and develop all the characters of those which feed on the more natural food-plants of the species, while at three different times crawling larvæ of the strawberry Aleyrodes were transferred to fresh leaves of a growing tomato plant, and all died within a few days, apparently without taking any food. That the *Aleyrodes vaporariorum* does not naturally feed on the strawberry is shown by the fact that a strawberry plant in a pot remained for over six months in a greenhouse thickly infested with that species and less than half a dozen Aleyrodes matured on its leaves, upon which even the imagoes were very rarely observed resting. It does not seem strange that where the natural food-plants were so thickly infested an egg should occasionally be deposited on other plants.

Incidentally it might be mentioned that *in this locality* the strawberry Aleyrodes in all its stages, including the egg, averages a little larger in size than the greenhouse Aleyrodes *(Aleyrodes vaporariorum)*.

Egg (Plate 2, Fig. 1).

The egg is irregularly oval, with one side more or less flattened; attached to the leaf by a short stalk, situated on the basal or more broadly-rounded end, usually a little to one side of the centre, toward the more rounded side. When freshly laid, the egg is pale green in colour, with a rounded orange-yellow body within, in a few days changing to a metallic bronze colour. The surface of the egg is unmarked. The length, exclusive of the stalk, is from .23 to .24 mm.; greatest width, from .08 to .095 mm. The stalk is from $\frac{1}{8}$ to $\frac{1}{4}$ the length of the egg.

The length of the egg stage depends upon the weather conditions. Those laid in late fall do not hatch until the following spring, while in the warm summer weather they hatch in about eight or ten days.

First Instar (Fig. 2).

In the first instar the general form is oval, the anterior end being the more broadly rounded, the sides of the thoracic region are approximately

parallel, the abdomen narrowing posteriorly. Immediately after hatching, the body is flat and thin, but just before the first moult it becomes well rounded above. The edge of the body consists of a thin, narrow, marginal rim, at the inner edge of which the body is abruptly thickened. From the under side of this thin rim many minute, glistening granules can be seen. The margin is entire, except for the attachments of the spines. On each side sixteen spines arise on or near the margin of the body. Excepting numbers two, seven and fourteen, counting from the anterior end, these are situated at nearly regular intervals. Number two arises a short distance from the margin on the under side of the body, quite close to the base of one ; it is directed downward, curving toward its mate. These spines are best seen from below. Number seven is separated from numbers six and eight by greater intervals than occur between other adjacent spines. Number fourteen arises a little nearer fifteen than thirteen. Number sixteen is very long, varying in length from one-third to one-half the length of the body. Number fourteen is from one-third to one-half the length of sixteen. Numbers one to seven gradually decrease in length. Numbers seven to thirteen are about equal in length, being from one-eighth to one-tenth the length of number sixteen. Number fifteen is slightly longer than thirteen. A marginal secretion of wax appears soon after the young larva settles down. This usually becomes wide enough to cover all but the fifteenth and sixteenth pairs of spines. The segmentation of the abdomen is quite distinct, that of the thorax very indistinct, essentially as in the pupa-case. The vasiform orifice is about as wide as long, its form being somewhat similar to an equilateral triangle with rounded corners. The operculum is subelliptical in outline, flattened on the basal side. The lingula is spatulate in outline, bearing a number of longitudinal rows of minute setæ, and on the caudo-lateral margin two pairs of spines, the posterior pair being the longer. When the lingula is in its natural position, the last-mentioned spines do not reach to the apex of the orifice. The orifice is bounded laterally by chitinous thickenings, which bend toward one another, but do not unite at the posterior end of the orifice. Just inside the apex of the orifice is a small, glistening, crescent-shaped structure, which may be simply a chitinous thickening or an opening in the integument. There are two pairs of reddish-brown eyes, a dorsal and a ventral pair, situated nearly opposite each other, just mesad to the thin marginal rim, and about equidistant from the fourth and fifth marginal spines on their respective

sides of the body. There are at least two pairs of minute dorsal spines. One pair is situated one on each side of the third abdominal segment; another pair is situated one on each side of and anterior to the operculum. Each of these four spines arises from a minute papilla, which, however, in certain lights, appear like cylindrical cavities or pores. From a study of later instars, it seems possible that another still more minute pair of spines occurs on the cephalic region, but I have not thus far distinguished any such with certainty. The two pairs above located are not difficult to see with a one-sixth inch objective.

On the ventral side of the body the legs, antennæ and mouth-parts are well developed in this instar. Each leg (Fig. 3) consists of a coxa, trochanter, femur, tibia and tarsus. The entire length of the leg when straightened is about one-half the width of the body. The coxæ are short and stout, and near the base of each of the two posterior pairs on the inner side is a spine about twice as long as the diameter of the coxæ. Trochanters short, those of the anterior pair of legs are subcylindrical, about one-third as long as wide. Those of the two posterior pairs of legs appear to be hoof-shaped, and all six trochanters bear a short spine anteriorly. The femur is about twice as long as the coxa and trochanter together, subcylindrical in form, tapering toward its outer end. The tibia is a little longer than the femur, and more slender; in the two posterior pairs of legs, bearing on its outer side, near its base, a spine as long as the whole tibia itself. This extends obliquely outward, and is usually curved near its tip. Under high-power objectives and with favourable light the tibiæ are seen to bear a number of very minute spines. The tarsus is short and knobbed at the tip, with a stout curved spine one-half as long as that borne on the tibia, arising on the outer side near its base. Diagonal lines connecting the two anterior pairs of coxæ would intersect at about the centre of the base of a conical papilla—the rostrum —from an opening in the apex of which the mouth setæ protrude. The length of these setæ varies, but when bent backward they usually extend beyond the hind coxæ. In front of these mouth organs is a prostomial plate or shield, subovate in form, the broader end being anterior. It is truncate where it touches the base of the mouth papilla, slightly concave on the sides posteriorly, broadly rounded anteriorly, with two movable papillæ on the anterior margin, each of which bears a long spine, about equal in length to those on the coxæ of the two posterior pairs of legs. From the anterior two-thirds of this plate are separated two

lenticular side pieces by distinct sutures. On the ventral surface of the abdomen, underneath the operculum, is a pair of spines, one on each side, about equal in length to those which arise at the anterior end of the prostomial plate. These spines extend backward, reaching nearly to the caudal margin of the body. The segmentation below is not as distinct as on the dorsal surface. Each antenna arises on a line with the coxæ of the legs of its respective side of the body and about opposite the anterior margin of the prostomial plate. They consist of four segments: the basal segment is short and stout; the second segment is twice as long as the first and more slender, reaching about to the margin of the body when the antennæ are directed outward; the third segment is very short and with two or three apical spines; the fourth segment is twice as long as the second, bearing a small spine at about two-thirds the distance toward the tip, and another larger one at the tip.

The colour of the larva is pale green, semitransparent, with two internal orange-yellow bodies of irregular rounded form, situated one on each side in the basal abdominal region.

The length in this instar varies from .29 to .35 mm.; the greatest width, from .16 to .18 mm.

The young larva is capable of crawling as soon as it emerges from the egg. It may crawl a short distance before settling down, or it may settle down quite near its place of birth. It is seldom able to crawl over the larger ribs of a leaflet, being prevented by the thick hairs of the leaf. After settling down it soon loses the use of its legs, and in the course of a day or two the lateral wax secretion appears. The first moult takes place in about five or six days. Lateral growth of the body between the moults is not appreciable, increase in size seeming to result almost entirely from growth in thickness. This is true of all the immature stages. Preliminary to moulting, the skin appears to split around the anterior margin of the body. It is then gradually moved back, aided by up-and-down movements of the abdomen, and usually drops off entirely, sometimes, however, remaining attached to the leaf. Moulting appears to be a slow process, two or three hours or a whole day intervening before the insect is entirely freed from its moulted skin. As each portion of the body becomes free from the skin, it seemingly flows out over the surface of the leaf, and immediately assumes the form and horizontal dimensions which continue throughout the instar.

Second Instar.

In this instar the form is more variable than in the first; broadly oval to elliptical, usually with a slight incurving on each side of the thoracic region. When oval, the anterior end is the more broadly rounded. The margin is finely crenulate, but there is no thin marginal rim as in the first instar. Immediately after moulting, the body is flat and thin, but before the next moult it becomes well rounded above. Three pairs of marginal spines are present: the first pair on the latero-cephalic region, one on each side; the second pair on caudo-lateral region, one on each side; and the third pair on the caudal margin. These probably represent spines number one, fourteen and sixteen, respectively, of the first instar. The third pair is a little more than one-tenth the length of the body, the second pair is about one-fourth the length of the third pair, and the first pair is even smaller than the second pair and may be difficult to distinguish. There are three pairs of minute dorsal spines: the first pair is on the cephalic region, one on each side of the middle; the second pair is on the first abdominal segment, one on each side; and the third pair is near the vasiform orifice, one on each side, opposite the operculum. These last are somewhat larger than the first and second pairs, which in some specimens may be difficult to distinguish. They are most readily seen immediately after the insect has moulted. A marginal wax secretion is present as in the first instar, appearing shortly after the moult. The segmentation of the abdomen is fairly distinct in the middle, that of the thorax more obscure. The vasiform orifice is relatively farther forward in this instar than in the preceding one. This is indicated by the comparatively greater distance from the apex of the orifice to the caudal margin of the body and by the fact that the spines on the dorsum, near the orifice, now lie opposite the operculum, instead of anterior to it, as in the first instar. The vasiform orifice is of about the same general form as in the first instar. The lingula is spatulate with two pairs of side lobes and one terminal lobe. On each side of the terminal lobe arises a seta or spine about one-half as long as the entire vasiform orifice. Between the two pairs of side lobes on each side a smaller spine arises. The upper surface of the lingula bears longitudinal rows of minute setæ, as in the previous instar. When in its natural position, the lingula reaches nearly to the apex of the orifice. The chitinous ridges which bound the orifice laterally do not meet behind, though the intervening space between them is comparatively smaller than in the previous instar. The eyes are

proportionally smaller than before, and are now situated internally, instead of at the surface, as in the first instar. The eyes on each side are about on a line with and outside of the two dorsal spines which have been mentioned as present on the cephalic region. The vestigial legs and antennæ can be distinctly seen, their relative position being as before. The antennæ are directed directly backward, reaching a little over one-half the distance to the base of the fore legs. They are thick at the base, narrowing toward the apex, covered with numerous minute papillæ. Their segmentation is indistinct, sometimes two and sometimes three segments being evident. They are immovable in this as well as the following immature stages. The legs are short, similar to a truncated cone in form, transversely wrinkled, with no distinct segments, terminating in a rounded knob, which, perhaps, functions as an adhesive disc. A few minute spines occur near the bases of all three pairs of legs. The mouth-parts are as before. The pair of spines at the anterior margin of the prostomial plate is wanting in this instar, but the pair on the ventral surface under the operculum is present as in the first instar. The colour remains as in the first instar. The length varies from .41 to .45 mm.; the greatest width, from .22 to .26 mm.

The second moult takes place in from four to five days after the first.

Third Instar.

In this instar the form, marginal and dorsal spines, marginal wax secretion, rudimentary legs, ventral spines, eyes and colour of the body are as in the second instar. The vasiform orifice is longer than wide, in form resembling a triangle with rounded corners. Operculum nearly semicircular, reaching about one-half the distance to the apex of the orifice. Lingula essentially as in the second instar. The antennæ arise nearer to the bases of the fore legs than in previous instars. They are indistinctly segmented, thick at the base, tapering toward the tip, the basal two-thirds of each is directed directly inward toward the antenna of the opposite side, while the apical third is bent backward toward the base, the whole forming a figure not unlike the letter J.

The length varies from .56 to .62 mm.; the greatest width, from .32 to .38 mm.

The third moult takes place in about five or six days after the second.

Pupa* (Fig. 4).

The form of the pupa is broadly elliptical, the margin finely

*As is customary in describing species of this genus, the specific characters are derived from the pupa. The description of this stage is therefore made complete in itself, and is sufficient to distinguish this from all other described species.

crenulate ; when freshly moulted, flat and thin, without wax secretions. The bodies of the mature pupæ appear to be raised from the surface of the leaf by a vertical wax fringe, the height of the body then being about one-third of the width. The dorsum is rugose and nearly flat. There are two pairs of marginal spines : the first pair occurs on the caudo-lateral margin, and the second pair on the caudal margin. The second pair in length is between one-tenth and one-eighth the length of the body, and the first pair less than one-fourth the length of the second pair. These last are readily seen by clearing the pupa in xylol and mounting in xylol balsam, or by boiling the pupa-case in KOH and mounting in glycerine. The second pair curve upward and backward, diverging at the base, usually converging posteriorly. There are three pairs of minute dorsal spines as in the previous instars : the first pair is on the cephalic region ; the second pair, one on each side of the first abdominal segment ; and the third pair one on each side opposite the operculum of the vasiform orifice. Of the three pairs, the third pair is slightly the largest. The segmentation of the abdomen is fairly distinct in the middle ; that of the thorax less so. The vasiform orifice is longer than broad, in form similar to a triangle with rounded corners. The orifice is bounded laterally by chitinous ridges, which unite posteriorly, thus differing from previous instars. The operculum is hemielliptical (in the form of an ellipse cut through its shortest axis), reaching from the anterior margin of vasiform orifice to a little over one-half the distance toward the apex. The lingula has one apical lobe and three pairs of side lobes, and is densely covered with longitudinal rows of minute setæ. From the sides of the apical lobe from below arise two spines, one on each side, which extend caudad beyond the apex of the orifice, their length being a little less than one-half the greatest width of the operculum. A second pair, less than one-fifth as long as these, arises one on each side between the first and second side lobes. The anterior pair of side lobes is frequently hidden by the operculum. A shallow furrow extends caudad from the apex of the orifice to the margin of the body.

There is no lateral wax fringe in this instar. The dorsal wax secretion consists of a double submarginal series of glassy waxen rods. The rods of the inner series are never farther away from those of the outer series than the width of their bases. The outer series consists of from about sixty to one hundred (sixty-six to ninety-eight are the limits actually observed) rods of variable length, some being very short, while others are

three-quarters the width of the body in length. In mature pupæ the rods of the inner are usually longer than those of the outer series. These (the inner series) are usually directed upward, and curve inward over the dorsum of the body. Their length varies, rarely exceeding the width of the body. The rods of the inner series usually alternate with from two to five rods of the outer series, the average number of rods in the inner series being about twenty. Irregularities in the position of the wax rods are frequent; in fact, no two pupæ are exactly alike in this respect, but of the hundreds examined none have been found to arise farther mesad from the outer series than the width of their bases.

On the venter the legs are indistinct, most readily seen in specimens which have recently moulted. Each is short and thick like a truncated cone, with a rounded disc or knob at the tip. They are transversely wrinkled, and bear minute spines as in the two previous instars, and their relative position remains unchanged. The rostrum (a conical, fleshy papilla, from the apex of which the mouth setæ protrude) is situated on the middle line of the body, about one-third the distance from the cephalic to the caudal margin, and nearly equidistant from the bases of the four anterior legs. The antennæ now lie partly hidden in pockets situated one on each side, just outside of the anterior pair of legs. They are directed backward, and are straight, conical in form, the diameter of the base being about one-half the length. They appear to be transversely wrinkled near their apex; no other signs of segmentation are visible. There is a pair of spines situated on the ventral surface, one on each side, below the operculum of the vasiform orifice, as in previous instars.

Colour: greenish yellow; empty pupa-cases white. Internal organs in the basal abdominal region, one on each side, give to this part of the body a bright yellow colour, as in previous instars. No eyes can be distinguished when freshly moulted, but as the pupa matures, the imaginal eyes appear as two brownish spots in the cephalic region.

The length varies from .748 to .88 mm.; the greatest width, from .407 to .54 mm.

The imagoes appear in from twelve to sixteen days. Thus, the time which the insect spends in the immature stages, including the egg, is from four to five weeks.

Adult.

♀. The length of the body of the adult female varies from 1.15 to 1.20 mm. The colour of head and thorax is pale yellowish buff;

abdomen pale lemon yellow ; tip of rostrum black ; legs, rostrum, except the tip, and the antennæ, are of same colour as head and thorax. The whole body, including appendages, is covered with a white, flour-like substance, which is absent at the time of emergence from the pupa-case, but appears in the course of an hour or two. This substance, presumably waxy, is soluble in ether and xylol, but insoluble in alcohol and water. The eyes are completely divided into an upper and a lower pair, both of which are reddish brown in colour. The upper pair is smaller and composed of smaller-sized facets than the lower pair. The antennæ consist of seven segments : first segment short and stout ; second segment three times as long as the first, club-shaped, stout, with a few slender spines near the apex ; third segment over twice the length of the second, and more slender ; segment four about one-fourth the length of the third and narrower than it, cylindrical at the base, slightly enlarged at the tip ; segment five one-half as long again as four, of the same form, but more elongate ; segment six slightly shorter than five, but longer than four, club-shaped, more slender ; segment seven is slightly shorter than six, spindle-shaped, with a small spine arising from a tubercle situated a little beyond the middle, and another smaller spine arising from the tip of the segment. All the segments of the antennæ, except the first two and the tip of the last, are ringed with chitinous ridges. The hind femur is about two-thirds the length of the tibia, the tarsus is about one-third the length of the tibia, and the second tarsal segment is about two-thirds the length of the first tarsal segment. Average length of the hind femur about .275 mm.; of the tibia, about .38 mm. The trochanters of the posterior pair of legs are deeply grooved on the caudal side, and at the bottom of the cavity thus formed arises a single stout spine, which is directed upward and outward. The vasiform orifice is subcircular in outline. The operculum is concave on its caudal margin, and covers the anterior half of the orifice. The lingula is protruding, setose, gradually enlarging distally, and squarely truncate at caudal end. The fore and hind wings are each provided with a single unbranched median vein. The margin of the wings is beaded all round, each bead consisting of a minute globule, from the outer side of which two or three minute setæ arise. The length of the fore wings is about 1 mm.; width, about .5 mm. The rostrum is three-jointed. Ovipositor ordinary, usually bent upwards when not in use.

♂. Average length about .90 mm. Proportionately smaller than female, otherwise differs only in the sexual organs.

I have named this insect in honour of Dr. A. S. Packard, who first called attention to its occurrence on strawberry plants at Amherst, Mass.

All stages described from numerous specimens. Types of pupæ and adults deposited in the collection of the Massachusetts Agricultural College.

Bibliography.

Aleurodes vaporarium, Pack. Am. Nat., Vol. IV., p. 686 (1871).

Aleurodes vaporarium, Pack. Guide, p. 712 (1883).

Aleurodes vaporarium (?), Garman. Ann. Rept. Ky. Exp. Sta., p. 37 (1890).

Aleurodes vaporarium (?), Garman. Agric. Science, Vol. V., p. 264, (1891).

Aleyrodes, sp. (?), Riley. Insect Life, Vol. II., p. 17, (1892).

Aleurodes sp. (?), Webster. Ann. Rept. Ohio Exp. Sta., p. xxxv. (1894).

Aleyrodes vaporariorum, Britton. 19th Rept. Conn. Exp. Sta., p. 203 (1896).

Aleyrodes sp. (?), Slingerland. Bul. 19, Cornell Exp. Sta., p. 155 (1901).

Aleyrodes vaporariorum (?), Britton. Bul. 140, Conn. Exp. Sta., pp. 3, 10, 14, 17 (1902).

Explanation of Plate 2.

(All Figs. greatly enlarged.)

Fig. 1.—Egg.

Fig. 2.—First instar.

Fig. 3.—Right hind leg, first instar.

Fig. 4.—Dorsum of the pupa.

AN ACKNOWLEDGMENT.

I desire, on behalf of the Entomological Society of Ontario, to publicly acknowledge its indebtedness to Mr. H. Bird, Rye, N. Y., for a series of recently-bred specimens of *Hydræcia*, and his magnanimous liberality in so freely parting with such rare species for its benefit, that cost him so much patient labour, valuable time and industrious research to secure. The expertness he has attained in discovering the food-plants and obscure breeding habits of this difficult genus is remarkable; whilst the perfection of scale and colour in the specimens that leave his hands is indescribable, and must be seen to be fully realized.

J. Alston Moffat, Curator.

IN MEMORIAM—R. J. WEITH.

Born September 15th, 1847, in Wroutke, Prussia; died September 15th, 1902, in Elkhart, Indiana. A few words of biography, together with the sad intelligence of his death, have already appeared in these pages; but it seems fitting that the life of one who was well known to many entomologists in America and Europe as an accurate observer, an indefatigable worker, a valued correspondent, and a sincere friend, should receive more than a passing notice.

From his son, Mr. Louis E. Weith, I have obtained some further facts. At an early age he was apprenticed as a barber, and from the age of thirteen until a short time before his death he followed this business. It was while at school, prior to his thirteenth year, that he acquired that love for nature which was ever afterward the passion of his life.

At twenty-five he came to New York; thence he went to New Orleans, afterwards to Memphis, to Chicago, and then to South Bend, Indiana, where he was married. Thereafter he removed to Elkhart, where he resided until his death.

His knowledge of entomology and his skill as a field naturalist were obtained by the devotion of all his spare moments (which were all too few) to these ends. His chief subject of study was the parasitic Hymenoptera. Of his work in this field I will leave others to speak. During the last few years of his life he took up, with great enthusiasm and success, the study of the life-histories of Odonata, Plecoptera and Ephemeridæ; and it is of some of the qualities of the work he did in this field that I wish to speak. He began by collecting and contributing data for Williamson's Dragonflies of Indiana. My correspondence with him began when he, having learned that I was seeking to obtain the immature stages of a dragonfly of peculiar and restricted distribution that he had found near his home, wrote me, offering to find these stages for me, if I would direct his efforts. I gladly wrote the few suggestions necessary, and he found the specimens wanted. At my solicitation he recorded his observations of that time for the readers of this magazine, in Vol. XXXIII., pp. 252–254. During the summer of 1902 he studied with great diligence the life-histories of the Stoneflies and Mayflies of his own locality, and made here other important discoveries that still remain to be published.

His letters, which came thick and fast during the collecting season, for he was continually sending specimens, were marked by an impetuous desire to know where were the gaps in our knowledge, in order that he

might endeavour to fill some of them. Once he wrote me : "Would it not be well if older students would oftener publish notices of what observations are needed to clear up mysteries in the life-history of this or that species? There are those, like myself, who are interested in natural history and who have collected for many years, who have many good chances to observe important biological facts, but who have no means of knowing which of their observations are new. I have seen many things the knowledge of which would have saved professional entomologists much time ; but, not knowing this at the time, and not wishing to print to be laughed at, I have let the observations slip. Had I not seen your note on unknown dragonfly nymphs in the CANADIAN ENTOMOLOGIST some time ago, the nymph of *Nannothemis* had probably not yet been found." And again : " I shall be glad to contribute my mite toward widening the scope of our knowledge of natural history." And again, when I had written him about some of Say's species of Perlidæ, unheard of since Say's day, he wrote : " I am anxious to find some of the missing ones."

His diligence and application were remarkable, and his care to keep his statements within the limits of his observations was most exemplary. He was the best type of unprofessional entomologist. He so loved nature, and trusted in the value of accurate knowledge of her ways, that he was willing—nay, happy—to work and to wait, to observe and to verify again and again, in order that he might be able to tell in the end the simple truth. American entomology was honored by his methods, and has lost one of her ablest field naturalists by his untimely death.

JAMES G. NEEDHAM, Lake Forest, Ill.

MALE WASP WITH FEMALE ANTENNÆ.

BY W. HAGUE HARRINGTON, F.R.S.C., OTTAWA.

Among some hymenoptera recently received from Mr. A. Gordon Leavitt, of St. John, N. B., is a very interesting male of *Thyreopus latipes*, Smith. The sexes of this genus are readily separated, as the males have the anterior legs remarkably modified; the tibiæ especially being developed in broad shields, or leaf-like expansions. The antennæ are simple in the female, but those of the male have the flagellum fusiform and compressed. In *T. latipes* the basal joints are broad, and the flagellum narrows from the second joint to the apex. Mr. Leavitt's specimen, taken at St. John, N.

B., on 29th June, 1901, was at once recognized as belonging to this species, and it was only on transferring the specimen to another box that it was seen to have simple antennæ instead of those so characteristic of the species to which it belongs. Examination with a lens established that they are the 12-jointed simple antennæ of a female. Indeed, the whole head approaches more closely that of a female than of a male. On comparing the head carefully with those of three males at hand, it is found to be less narrowed behind the eyes and somewhat flatter on the front. Such aberrations may not be uncommon, but have not been observed by me, and in a large proportion of the hymenoptera the sexes are so alike in structure that similar modifications would not attract attention. *T. latipes* has a wide distribution through Canada and the United States, from the Atlantic to the Pacific, but the male only is known. In "The Crabroninæ of Boreal America," Trans. Am. Ent. Soc., XXII., 129, Fox says that *T. (Crabro) vicinus*, Cress., will probably be placed as the female of *latipes* eventually. I have not examples of this form, but the description of it supports such a view, and it is known only in the female sex. It is recorded by Fox from Colo., Nebr., Nev., Ariz., Cal., Oreg., Mont. and Wash. In Mr. Leavitt's specimen the scape of the antennæ is yellow, with a black line above, as in other males of *latipes*; in *vicinus* the scape is described as yellow, sometimes spotted behind with black.

THE COCCINELLID GENUS SMILIA, WEISE.

BY T. D. A. COCKERELL, E. LAS VEGAS, N. M.

The small Coccinellidæ commonly known as *Smilia* are among the more important natural enemies of the Coccidæ. The name *Smilia* properly belongs to a well-known genus of Homoptera, so in *Science Gossip*, 1900, p. 606, I proposed to call the Coccinellid genus *Epismilia*. I now learn from the *Index Zoologicus* that *Epismilia* was used in 1859 for a genus of Coelenterates. I therefore propose another name for *Smilia*, Weise, namely, MICROWEISEA. The North American species are *Microweisea misella* (Lec.), *M. marginata* (Lec.), *M. coccidivora* (Ashm.), *M. ovalis* (Lec.), *M. atronitens* (Casey), *M. minuta* (Casey), *M. planiceps* (Casey), *M reversa* (Fall); all standing in our lists under *Smilia*.

Stictomela, Weise, from E. Africa, and *Platylæmus*, Weise, are also homonyms, and will have to be changed.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 12.—Continued from Vol. XXXV., p. 8.)

Family XXXVII.—Tiphiidæ.

By most systematists this family is still classified with the *Scoliidæ*, although separated as a distinct family by the Swedish entomologist, C. G. Thomson, as early as 1874. I agree with Thomson, and believe these wasps form a distinct family, easily recognized by the characters made use of in my table of families.

The genus *Engycistus*, Fox, based upon *Myzine rufiventris*, Cresson, was classified by Cresson, Cameron and Fox with the *Scoliidæ*. Mr. Fox has kindly sent me specimens for examination, male and female, and I find them true Tiphiids; they have nothing to do with the *Myzinidæ* or *Scoliidæ* as now restricted.

The genus *Pterombus*, Smith, still unknown to me in nature, also evidently belongs here.

Mr. Peter Cameron, in Biologia Centrali-Americana, has described a number of species under the genus *Epomidiopteron*, De Romand. Those of his species that I have recognized, however, do not belong to it, but belong to the genus *Paratiphia*, Sichel. *Epomidiopteron*, De Romand, is something quite different, and is apparently closely allied to *Engycistus*, Fox.

In habits the *Tiphiidæ* agree with the *Scoliidæ*, being parasitic upon ground-inhabiting beetle larvæ. *Tiphia inornata*, Say, attacks our *Lachnosterna* larvæ, but it is widely distributed and must have other hosts.

Table of Genera.

1. Females.....2.
   Males.....7.
2. Marginal cell *open* at apex.....5.
   Marginal cell *closed* at apex; first transverse cubitus complete, the first and second cubital cell separated.
   Cubitus in hind wings interstitial with the transverse median nervure, or originating *just* before it; three cubital cells in front wings.....3.

Cubitus in hind wings originating *before* the transverse median nervure.....5.

3. Hind femora *not* produced at apex beneath.....4.
Hind femora produced at apex beneath.
Hind tibiæ very strongly *serrate* on the outer face.....Engycistus, Fox.
(Type Myzine rufiventris, Cress.)

4. Hind tibiæ denticulate or tuberculate on outer face; the front tibiæ produced into a long, acute spine at the middle.....Epomidiopteron, De Romand.
(Type E. Julii, De Romand.)
Hind tibiæ *not* serrate on the outer face, the front tibiæ normal, unarmed.....Pterombrus, Smith.
(Type P. aenigma, Smith.)

5. Front wings with *two* cubital cells.....6.
Front wings with *three* cubital cells.
Cubitus more or less obliterated at its origin; second and third cubital cells each receiving a recurrent nervure, the first recurrent nervure strongly curved or angularly broken by a stump of a vein and received by the second cubital cell at its basal third; tegulæ abnormally large; mandibles bidentate; claws cleft.....Paratiphia, Sichel.
(Type P. albilabris, Sichel.)

6. First transverse cubitus entire, *not* angularly broken by a stump of a vein; middle tibiæ with only *one* apical spur.....Tiphia, Fabricius.
(Type T. femorata, Fabr.)

7. First transverse cubitus entire, *not* obliterated at base, the first and second cubital cells distinctly separated.....8.
First transverse cubitus obliterated at base, the first and second cubital cells more or less confluent.....9.

8. Cubitus in hind wings interstitial with the transverse median nervure or originating just before it; hind tibiæ serrate, the tarsi very long.....Engycistus, Fox.
Cubitus in hind wings originating a little *before* the transverse median nervure.
Hind tibiæ denticulate or tuberculate on outer face.....Pterombrus, Smith.
Hind tibiæ not serrate on outer face, the tarsi normal.....Epomidiopteron, De Romand.

9. Three cubital cells, the second not longer than the third..... Paratiphia, Sichel.
Two cubital cells, the second very transverse..... Tiphia, Fabricius.

FAMILY XXXVIII.—Cosilidæ.

This family is based upon the genus *Cosila*, Guérin, described in 1839 from Chile. The affinities are most perplexing, although apparently closely allied to the *Myzinidæ*, *Scoliidæ* and *Tiphiidæ*. The middle coxæ, however, are much closer together than in those families; the eyes in *both* sexes are *entire*, not emarginate within; the venation of the wings, too, is different, while the male genitalia is quite characteristic and totally different from that in the families mentioned. In having the eyes entire in both sexes, it agrees with the family *Tiphiidæ*, but may be easily separated by coxal characters, by venation and by the unarmed hypopygium of the males.

I have also placed in this family the genus *Fedtschenkia*, Saussure, unknown to me in nature. Both Saussure and André, however, place it with the *Mutillidæ*, and Mr. Ernest André has even gone so far as to make it the type of a subfamily—the *Fedtschenkiinæ*. My reason for differing from these eminent authorities is that the female is *winged*, while all known females in the *Thynnidæ*, *Myrmosidæ* and *Mutillidæ* are always *wingless*, never winged. The abdomen in the male, too, is unarmed and totally unlike that in the *Mutillidæ* and allied families, a most important character, which, in my opinion, is sufficient to exclude it from any of those families.

Table of Genera.

1. Front wings with *two* cubital cells.....2.
Front wings with *three* cubital cells.....3.
2. First cubital cell about *thrice* as long as the second, receiving the first recurrent nervure at its apical third; pronotum shorter than the mesonotum; scutellum *with* lateral keels; metathorax striate, the sides toothed.....Nursea, Cameron.
(Type N. carinata, Cam.)
First cubital cell about *twice* as long as the second, receiving the first recurrent a little beyond its middle; submedian cell slightly shorter than the median; pronotum not shorter than the mesonotum; parapsidal furrows distinct; scutellum *without* lateral keels; metathorax not striate, but with a delicate median keel and keeled at sides, the spiracles small, rounded; abdomen fusiform, with a

constriction between the first and second segments, the first segment trapezoidal, convex above, not longer than wide at apex. ♂ (♀ unknown)..... .....Sierolomorpha, Ashmead.
(Type Sierola ambigua, Ashm.)

3. Second and third cubital cells each receiving a recurrent nervure....4.
Second cubital receiving both recurrent nervures.
Claws cleft; marginal cell not separated from the costa at apex; first joint of flagellum a little shorter than the second. ♂ ....Cosila, Guérin.
(Type C. Chilensis, Guér.)

4. Claws cleft, or with a tooth or lobe at base beneath..... .....5.
Claws simple.....6.

5. Claws with a tooth beneath; head large, quadrate or nearly, armed with a tooth on each side beneath..... Dicrogenium, Stadelman.
(Type Pristocerus rosmarus, Stadelm.)
Claws usually cleft; head transverse, unarmed.
Claws not dilated into a rounded lobe at base; hind tibiæ serrate; marginal cell at apex rounded, separated from the costa and usually with an appendage; cubitus in hind wings originating before the transverse median nervure. ♀ .....Cosila, Sichel.
Claws dilated into a rounded lobe at base; hind tibiæ with the superior margin tuberculate, crenate and pilose or spined between the tubercles; third cubital cell anteriorly not dilated.
Marginal cell at apex entire.....Callosila, Saussure.
(Type Myzine signata, Smith.)
Marginal cell at apex strongly truncate... Colobosila, Sichel.
(Type C. fasciculata, Sich.)

6. Head not large, quadrate, quite differently shaped.....7.
Head very large, quadrate; ocelli subtriangularly arranged; mandibles short, stout, bidentate; antennæ short, inserted on the anterior part of the face, the scape stout; marginal cell hardly as long as the first cubital cell, rounded at apex, the submedian cell much longer than the median.....Maurillus, Smith.
(Type M. australis, Smith.)

7. Head subglobose, the ocelli close together in a triangle; mandibles tridentate; antennæ inserted close to the anterior margin of the head, filiform, the scape longer than joints 2 and 3 united; marginal cell long, subtruncate at apex; median and submedian cells equal;

cubitus in hind wings originating *beyond* the transverse median nervure..... ..... Fedtschenkia, Saussure.
(Type F. grossa, Sauss.)

Head transverse, seen from in front longer than wide; the eyes large, occupying the whole side of the head, and extending from base of mandibles to vertex; mandibles bidentate, the outer tooth much longer than the inner; maxillary palpi 4-jointed, labial palpi 3-jointed; antennæ 12-jointed, rather long, the flagellum subclavate, inserted on the anterior margin of the head; pronotum considerably longer than the mesonotum, the latter with two widely separated furrows; scutellum fully one-third longer than the mesonotum; metathorax long, obliquely rounded off posteriorly; abdomen fusiform, a little longer than the head and thorax united, with a constriction between the first and second segments..... Isotiphia, Ashmead, gen. nov.
(Type I. nigra, Ashm.)

1. *Isotiphia nigra*, sp. nov. ♀.—Length 4 mm. Polished black, the head and the mesonotum with some sparse punctures, the metathorax rugulose; antennæ brownish, towards apex black; tips of tibiæ and tarsi testaceous; wings hyaline, with a fuscous cloud through the discoidal cells, and another through the second and third cubital cells and the disk of the wings.

Brazil: Santarem. One specimen.

Family XXXIX.—Rhopalosomidæ.

The writer established this family in 1896. It was based upon *Rhopalosoma Poeyi*, Cresson, a most singular looking wasp, that, on account of its colour, the subemarginate eyes and the prominent ocelli, resembles an ichneumon-fly of the subfamily *Ophioninæ*. Mr. Cresson described it as a Braconid. It is, however, a true aculeate, and shows some affinity with the *Myrmosidæ* and *Mutillidæ*, through such genera as *Brachycistis*, *Tricholabioides*, *Photopsis*, *Magrettina*, etc.

The family was very fully discussed in my paper entitled "Rhopalosomidæ, a new family of fossorial wasps," published in the Proceedings of the Washington Entomological Society, Vol. III., 1896, pp. 303–9.

The only genus known may be recognized by the following characters:

Eyes emarginate within; antennæ long, slender, the joints of the flagellum long, cylindrical, each joint with two spurs at apex within; front wings with two oblong, closed cubital cells, the second receiving the recurrent

nervure a little before the middle; abdomen long, clavate, the petiole very long; legs long, the tibial spurs 1, 2, 2, very long and straight; tarsi long, the middle and hind tarsi with joints 2–4 broad and dilated, densely pubescent beneath, subemarginate and armed with some stiff spurs at apex; claws long, curved..... Rhopalosoma, Cresson.
(Type R. Poeyi, Cr.)

TUTT'S "BRITISH LEPIDOPTERA" — A REPLY TO DR. DYAR.

It is in no spirit of carping criticism that I write in reply to Dr. Dyar's remarks on the 3rd volume of Mr. Tutt's *British Lepidoptera*. Far otherwise, for I have always considered myself as one of his disciples, as it was his and Dr. Chapman's stimulating work on Lepidopterous larvæ that first aroused my interest in this branch of entomology, and my chief object in the following remarks is a desire to arrive at a clearer understanding, in view of future work. Unfortunately, owing to the extremely limited time at my disposal, I am not nearly so well versed in the literature of my subject as I should be, it being a question of choosing between first-hand work, at the risk of repeating through ignorance of what another has already done, or acquiring a fuller knowledge of what other workers are doing. I have chosen the former, and this must be my excuse if I have missed some important work of Dr. Dyar's that has already settled some of the points I raise.

With regard to tubercle v of the Sphinges, I gladly acknowledge that the error which led Mr. Tutt astray was chiefly mine, as Mr. Tutt was in this instance largely relying on my notes. I am the more ready to take this action in that by so doing I find myself in company with Dr. Dyar himself, my mistake being, perhaps, somewhat analogous to the mistake so readily acknowledged by him with reference to his statement of the absence of tubercle iv. in the Saturniids ("Additional Notes on the Classification of Lepidopterous Larvæ," *Transactions of the New York Academy of Sciences*, 1894, Vol. XIV., p. 51). Tubercle v. on the abdominal segments of Sphingid larvæ is, normally, not only moved up to the level of the spiracle, but is, in addition, shifted forward until it is situated almost on the verge of the anterior edge of the segment, and it was owing to this unusual position and the fact of there being an accessory tubercle in this position in Lachneid larvæ which led me astray. Almost before the volume had left the binder's hands, an examination of some

notes I had made some time previously, but forgotten, with regard to the 1st instar of *Sesia (Macroglossa) stellatarum*, caused me to doubt the correctness of our conclusion, and the opportunity of examining larvæ of *Hemaris tityus (bombyliformis)* and *Hyles (Deilephila) euphorbiæ* in their first skins has proved to me that Dr. Dyar's view is undoubtedly correct. In its first instar, the larva of *Sesia stellatarum* has tubercle v. on the first abdominal segment below the level of the spiracle, although still at a higher level than iv. It is definitely situated on the lateral flange, which on this segment bends upwards towards the anterior margin. Much the same condition also obtains in the same segment in *Hemaris tityus*, v. being on the lateral flange in front of iv. and below the level of the spiracle; while in *Hyles euphorbiæ* iv. and v. on the first abdominal segment are consolidated at base, the two setæ being a very short distance apart and both rising from a small oval plate beneath the spiracle.

The next point raised is with regard to the union of tubercles iv. and v., or, more correctly speaking, their inclusion within the limits of a group of hairs on a raised skin area or wart beneath the spiracle, on the larva of *Lasiocampa quercus* and *Pachygastria trifolii*. This union or inclusion is a condition which, as Mr. Dyar himself has shown, is of not infrequent occurrence in some groups of Lepidoptera, and is met with in many different stages of development, e. g., from the condition obtaining in *Anthrocera (Zygæna)*, where, in the second stadium, iv. and v., without becoming appreciably nearer together than they were in the 1st larval stage, are surrounded by an irregular group of secondary setæ, the whole group being situated on a slightly-raised skin area, to the definite sharply outlined and more or less raised wart, a condition such as obtains in Saturniids or certain larvæ of the Pterophorina. In at least one species of the latter group (I think *Marasmarcha phœodactyla* is an example) this inclusion of iv. and v. is beautifully demonstrated owing to the primary setæ having black bases, while the secondary setæ have pale ones. Now Dr. Dyar, without directly contradicting such an union or inclusion of iv. and v. within the limits of a single subspiracular wart in *Pachygastria trifolii*, calls it in question, and I would ask if he has examined the larva of this species in its first instar. Fortunately, I have by me specimens of this larva roughly mounted for the microscope, and I have carefully re-examined the same, and can find only the three many-haired warts mentioned near the spiracle, viz., iii. above it, the accessory perpendicular, and the subspiracular wart which I take to contain within its

limits the primary setæ iv. and v. I can find no trace of any small tubercles, single-haired or otherwise, in proximity to the spiracle or these warts. I may here remark that the 1st stage of *P. trifolii* shows a much more primitive condition than that of *L. quercus*, the warts being smaller and bearing fewer hairs, while the absence of any secondary hairs arising from the general skin surface obviates the difficulty of discriminating between primary and secondary characters that one finds in the last named species. Had I not examined the larva of *P. trifolii* I should not have written "iv. + v. almost post-spiracular" with regard to *L. quercus*, as without this key, any of the numerous secondary hairs in proximity to the spiracle might be taken for either iv. or v., or single hairs might have been chosen for both and the large wart designated as a secondary character. Unless, therefore, my eyesight is greatly at fault we must either consider iv. and v. to be included within the subspiracular wart of *P. trifolii*, and by analogy within that of *L. quercus*, or conclude that one of them has been lost; and, in view of what Dr. Dyar has said in regard to the possible loss of v. in the Sphinges and what we know as to the ready tendency of iv. and v. to become members of a common group of setæ in certain groups of larvæ, and the possibility of their becoming consolidated on a single segment of a larva of one species or tribe (see previous remarks *re Hyles (Deilephila) euphorbiæ)*, the line of least resistance is surely greatly in favour of the first-named conclusion. My slide showing a 1st stage larva of *P. trifolii* is at Dr. Dyar's disposal should he care to examine it.

On the question of whether the first stage of *Aglia tau* is to be considered a specialized one, I must join issue with Dr. Dyar on two points: firstly, as regards the very restricted meaning attached by him to the words "Primitive first stage." This would bring the first skin larvæ of such species as *Staurop*us *fagi* and *Dicranura vinula* within the category of having a primitive or unspecialized first stadium. Even if it were possible to get a majority of entomologists to accept this sense, it would still be entirely at variance with the sense in which these words would be understood by biologists at large. Secondly, even if we accept the special meaning in which Dr. Dyar uses the term, the condition implied is *not* present in the 1st instar of *Aglia tau*. Not only are the large horns identifiable with tubercle i. on the meso- and meta-thoracic segments and the transversely conjoined i. + i. belonging to the right and left sides of the 8th abdominal segment bear setæ on their lower lateral branches, besides those on the terminal forks, but the raised

bases of iii. and iv. are forked and bear *two* setæ and there are also additional secondary setæ rising from the general skin surface that are in no way associated with the primary tubercles. I have preserved but unmounted larvæ of this species in their 1st instar, and as with *P. trifolii* I shall be glad to forward them to Dr. Dyar if he desires to examine them.

There does not appear to be any issue between us with regard to *Dimorpha*, but I should like to enquire as to what is inferred by the remark "but it does not suggest the *Lachneidæ* nor *Liparidæ* proper." Are we to understand this as denoting a relationship between these two groups other than the general one in that both belong to the same order?

A. Bacot.

154 Lower Clapton Road, London N.E., England, Dec. 7th, 1902.

A NEW SPECIES OF HYPOLÆPUS, KIRBY.

BY J. CHESTER BRADLEY, PHILADELPHIA, PA.

Hypolæpus Viereckii, sp. nov.—Dark, abdomen white beneath, legs partly white, wings hyaline, nervures white at base. Length, 7–8 mm.

♀.—Head shining black; face below the insertion of the antennæ, a narrow band between the antennæ and the eyes, head above the eyes, and the temples, white; antennæ black, nine-jointed, third slightly arcuate, thicker and longer than the fourth, which is in turn longer than the fifth, and so on to the last. Thorax shining black, laterally in front of wings white; wings hyaline, nervures brown, whitish at base of wing; first transverse cubitus transparent, without colour, second submarginal celi receiving two recurrent nervures, lanceolate cell petiolate, only one marginal cell; legs dark brown, all coxæ and trochanters, tibiæ except tips and basal third of posterior femora, white; posterior tibiæ slightly enlarged, longitudinally sulcate, first joint of posterior tarsi as long as the other three combined, the last joint being especially short. Abdomen cylindrical, slightly angled laterally and more so dorso-medially; dorsal segments dark brown, ventral segments entirely white.

The paratypes have the second transverse cubital and the first recurrent nervures interstitial; the first transverse cubitus is often coloured, and the anterior two pairs of tarsi are often pale.

Habitat.—Westville, N. J., Sept. 12. Mr. H. L. Viereck, 7 specimens (♀). Type in the collection of the American Entomological Society. Paratypes in the collection of the Wagner Institute in this city, the collection of the U. S. Nat. Museum, and the author's collection.

A NEW DIASPID GENUS.

BY R. A. COOLEY, AGRICULTURAL COLLEGE, BOZEMAN, MONTANA.

In Professor T. D. A. Cockerell's "First Supplement to the Check-list of the Coccidæ" (published in the bulletin of the Illinois State Laboratory of Natural History, 1899), the following footnote occurs on page 398: "Phenacaspis, Cooley and Ckll., will be a new genus, to include *P. nyssæ*, *Chinensis*, *engeniæ*, etc., hitherto placed in *Chionaspis*. Mr. Cooley and the present writer agree that these forms have no generic relationship with genuine *Chionaspis* except through *Aulacaspis* and *Diaspis*. I leave Mr. Cooley to publish the generic characters, and classify the species."

The present paper gives the generic characters of Phenacaspis.

PHENACASPIS, gen. nov., Cooley and Ckll.

Scale of female elongated, with the exuviæ at the anterior extremity, white. Scale of male much smaller than that of female; elongated, with the scales nearly parallel. With two longitudinal grooves on the dorsal surface, causing one or three carinæ, which vary in prominence in different species. Pygidium with the terminal pair of lobes more or less sunken into the body, and having their inner edges serrate or crenate, and strongly divergent, leaving a distinct notch on the median line.

The colour and shape of the scales of the two sexes, together with the median notch of the pygidium, are the essential characters of the genus.

Since in Professor Cockerell's note *nyssæ* is the first species named, I suggest that this species be considered as the type of the genus.

CATALOGUE OF THE LEPIDOPTERA OF NORTH AMERICA.

The new Catalogue of the Lepidoptera of North America which I have prepared has been issued as Bulletin No. 52 of the United States National Museum. It comprises 740 pages. The edition is being distributed by the Smithsonian Institution, without charge. Those not receiving the publications of the National Museum regularly, and who are interested enough in entomology so that this publication would be of practical use to them, will be cheerfully recommended by me to receive a copy, on making application to the undersigned.

HARRISON G. DYAR, Washington, D. C.

BOOK NOTICE.

Species des Hyménopteres d'Europe et d'Algerie : Les Mutillides—Par Ernest André. A. Hermann, 6 et 12, Rue de la Sorbonne, Paris, France.

This work, representing the 8th volume of André's great work on the European Hymenoptera, begun in 1888 by Edmond André, is now completed by the publication of fascicle 81.

The volume before us is devoted to a consideration of the family *Mutillidæ*, a large family of parasitic wasps living principally in the nests of bees and predaceous wasps, and is written by Ernest André, a brother of Edmond, contains nearly 500 pages, 25 plates, and gives full descriptions of all the *Mutillidæ* occurring in Europe and Algiers ; the first fascicle appeared in 1899.

After a brief preface and the definition of the family, Mr. André gives a good historical sketch of the family, which is based upon the genus *Mutilla*, Linné, established in 1758. From this sketch one may gain an excellent idea of the vagueness and confusion that existed among earlier authorities respecting genera, the great difference of opinion held by the more distinguished, and the slowness with which the modern and the more correct conception of a genus became established.

Mr. André devotes many pages to thoroughly defining the structural characters of these wasps, their life evolution and biology, and their geographical distribution. He finds that they are distributed over the entire world, and estimates that 1,600 species are known ; of this number about half are found in America, the others being distributed in Europe, Africa, Asia and Australia.

After a good bibliography, in which 209 works and papers, treating on these wasps, are listed, he enters into a systematic account of the family, genera and species. He divides the family into *four* tribes : I., *Fedtschenkiinæ*; II., *Apterogyninæ* ; III., *Methocinæ*; and IV., *Mutillinæ*. No one, probably, will object to Mr. André's groups ; they are natural and well characterized. But most decidedly some will differ with him as to their rank and the position assigned them ; I do.

In my opinion *three* of these tribes do not belong to the family *Mutillidæ (sens. str.)* ; they differ too widely in many important characters to be included in the same family, although probably all are natural minor groups in other families. *Fedtschenkia* is winged in both sexes, and I have placed it in the family *Cosilidæ*; the male has *not* the characteristic genitalia of a Mutillid. The *Apterogyninæ* should be placed in the family

Myrmosidæ, the female having the thorax divided and the male having the hypopygium ending in an upward curved aculeus; while the *Methocinæ*, excluding the genus *Milluta*, which is a genuine Myrmosid, belong to the family *Thynnidæ*, and are the only representatives of the family found in Europe.

Milluta, André, only superficially resembles a genuine Methocine, and falls in naturally with many genera in the Myrmosidæ. In the supplement terminating the volume, Mr. André thinks the characters upon which my recently established genus *Magrettina* were based rather *specific* than *generic*, and makes it a synonym of *Milluta*, André. This, however, is merely an opinion, but coming from one who has done such excellent work in the Mutillidæ as Mr. André, has weight and should receive consideration. I must, however, differ from him. In my original diagnosis I called attention to the close relationship *Magrettina* had to *Milluta*, and still think it distinct. When my revised generic tables of the *Thynnidæ*, *Myrmosidæ* and *Mutillidæ* appear, in my classification of the Vespoidea, now in course of publication in the CANADIAN ENTOMOLOGIST, I feel convinced Mr. André will also think differently. I shall make use of characters that are generic, not specific, at least in my estimation.

In the opinion of Mr. André, *Alloneurion*, Ashmead, which was founded upon *Agama Kokpetica*, Radoszkowski, is based upon an accident of venation, and is absolutely not distinct from *Pseudophotopsis*, André. Who knows? All specimens I have seen have the venation alike in *both* wings!

Mr. André has subdivided the genus *Mutilla*, Linné, although he calls the divisions only subgenera; it is a move in the right direction, and is destined to be universally followed. On page 129 he tabulates 10 subgenera, as follows: *Ephutomma*, Ashm.; *Pseudophotopsis*, André; *Tricholaliodes*, Radosz.; *Myrmilla*, Wesm.; *Platymutilla*, André, n. g.; *Nanomutilla*, André, n. g.; *Mutilla*, Linné; *Cystomutilla*, André; *Dasymutilla*, Radosz.; and *Stenomutilla*, André. Each subgenus is then taken up in order, fully described in both sexes, when known, and followed by a table of the species. Full notes on distribution and habits accompany every description.

The work terminates with a methodical and synonymical catalogue of the species. In all 116 species have been recognized and fully described, besides many varieties. *Mutilla maura*, Linné, according to Mr. André, has 14 varieties; *M. rufipes*, Fabricius, has 9 varieties, and other species have a less number of varietal forms.

The very full tables and descriptions of all the European species, and the numerous plates, make the work invaluable to all students of the Hymenoptera. It is the best and most important work yet published on the family.

WILLIAM H. ASHMEAD.

Mailed February 6th, 1903.

EDMUND BAYNES REED,

ORIGINAL MEMBER OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO,
1863–1903.

The Canadian Entomologist.

VOL. XXXV. LONDON, MARCH, 1903. No. 3

EDMUND BAYNES REED.

The older members of the Entomological Society of Ontario will, no doubt, welcome with much pleasure the portrait of MR. EDMUND BAYNES REED, which is prefixed to this number of our magazine. He was one of the small band who originated the Society on the 16th of April, 1863, and is one of the few survivors who may expect to commemorate its fortieth anniversary next month.

Mr. Reed came to Canada from England when a young man, and took up his abode in London, where he, for some time, practised his profession as a lawyer. Later on he became Secretary-Treasurer of the Synod of the Diocese of Huron, and continued to occupy this position till he left for British Columbia in 1890. He was always devoted to Natural History, and especially to the collection and study of insects. His leisure time was largely given up to these pursuits and to the work of the Entomological Society, in which he took the warmest interest. He and Dr. Saunders were instrumental in forming the London Branch of the Society and keeping up the enthusiasm of its members. When the headquarters of the Society were removed to London, and there was, in consequence, no further need of a Branch, Mr. Reed took an active part in everything that was done, and gave most material help in the formation and increase of the Library and collections. He was Secretary-Treasurer of the Society in 1871–2–3, and from 1880 to 1886; Vice-President in 1874, 1877, and from 1887 to 1889; member of the Council from 1874 to 1876, and in 1878–9; and during many of these years Librarian and Curator in addition. The following extract from the report of the Council for the year ending August 31st, 1890, bears testimony to his usefulness and services:

"In consequence of the removal of Mr. E. Baynes Reed from London to British Columbia, to take charge of the Dominion Meteorological Station at Victoria, it will be necessary to make some new arrangements

for the care of the Library and collections and the performance of the official work of the Society.... The Council desire to place on record their feelings of deep regret at the removal of Mr. Reed from this Province and the loss which the Society thereby sustains. Mr. Reed is one of the original members of the Society, and for more than a quarter of a century has been one of the most active and zealous of its officials, filling at different times the positions of Vice-President, Secretary-Treasurer, Librarian, Curator, and Auditor. To him it is especially due that the Library has grown to its present dimensions and value and that so much progress has been made by the Society in many directions. The Council beg to thank Mr. Reed for his services in the past, and wish him all possible success and prosperity in his new and important sphere of labour."

Mr. Reed was a constant contributor to the pages of the CANADIAN ENTOMOLOGIST from the very first volume, in which appeared five articles from his pen. His papers, largely collecting notes, records of rare captures, etc., were always interesting and valuable; he also furnished descriptive articles on larvæ, an Accentuated List of Canadian Lepidoptera, a report to the Ontario Department of Agriculture (jointly with Dr. Saunders) on the Colorado Potato-Beetle, which had then invaded Western Ontario from the neighbouring State of Michigan, and popular papers on common insects.

In the preparation of the early Annual Reports of the Society he took a large share, and contributed elaborate and valuable papers, as follows: Insects affecting the Plum, Report i. (1870), pages 53–63, and Report ii. (1871), pp. 22–26; Insects injurious to the Potato, ibid, pp. 65–81; Insects attacking the Cucumber, Melon, Pumpkin and Squash, ibid, pp. 89–92; Insects affecting the Maple Trees, Report iii. (1872), pp. 35–43; Insects affecting the Peach, ibid, pp. 44–47; Insects affecting the Potato, ibid, pp. 48–50; Some common Insects which affect the Horse, Ox and Sheep, Report iv. (1873), pp. 34–41; Entomological Contributions, Report v. (1874), pp. 11–16; Sphingidæ—Hawk-Moths, Report xii. (1881), pp. 48 70; Diptera—Two-winged Flies, Report xiii. (1882), pp. 45–53, and short articles in several of the volumes. From the above list it will be seen that Mr. Reed gave much attention to Economic Entomology, and did some very excellent work in that department. It was quite fitting, therefore, that he should have been one of the company who, in August, 1889, formed the Association of Economic Entomologists, and signed its original Constitution.

Another valuable and important work that Mr. Reed performed for the Society was the compilation of a General Index to the first thirteen Annual Reports, 1870–1882, which proved of the greatest use for many years to the members of the Society and others who had occasion to refer to these publications.

For some time before he left London, Mr. Reed took a great interest in meteorological observations, and in connection with the Observatory at Toronto established a local station and installed the necessary instruments. His anemometer and vanes were placed on the top of the Cathedral tower and connected by wires with his residence on the corner of Park and Queen's Avenues. The work that he thus performed was so accurate and satisfactory that he was selected to take charge of the Pacific Coast Division of the Dominion Meteorological Service, and since 1890 he has continued to fill the office of Superintendent of the Observatory at Victoria, B. C. Though his time is fully taken up with his official duties, he continues to be interested in Entomology, and is a member of the British Columbia Natural History Society. His many friends will, no doubt, heartily join with us in the wish that he may enjoy the blessings of health and well-being for many a year to come, and retain the vigour and vivacity which have always been his characteristics. C. J. S. B.

THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

REPORT OF THE SECRETARY, C. L. MARLATT.

Washington, D. C., Dec. 30, 1902, and Jan. 2, 1903.

The members of the Association of Economic Entomologists and the local Entomologists of Washington connected with the Entomological Society of Washington, at the conclusion of the meeting of the first-named Association, met in an informal reunion and smoker at the residence of Mr. Wm. H. Ashmead, on the evening of December 27th, 1902. At this meeting the subject, first broached in the concluding session of the Association of Economic Entomologists, of reviving the Entomological Club of the A. A. A. S. was considered, and, in the absence of the last President of the Club, the Rev. C. J. S. Bethune, Mr. Schwarz was made Chairman of the meeting for the purposes of this discussion. A general desire was manifested on the part of those present to have the Entomological Club revived or some other similar organization instituted. To make

the preliminary arrangements a committee was appointed, consisting of Mr. Schwarz as Chairman, and including also Messrs. Fletcher, Herbert Osborn, Kellogg and Hopkins. This committee held a meeting at the Cosmos Club on the afternoon of December 28th, and arranged for a revival of the old Entomological Club of the American Association, and fixed the first meeting for Tuesday evening, Dec. 30th, at 7.30, in a room provided in the Columbian Law School.

This meeting of the Club was called to order at the hour named by Mr. Schwarz, as Chairman of the Provisional Committee The following persons were present:

Henry A. Ballou, Amherst, Mass.; J. Chester Bradley, 2221 Spring Garden St., Philadelphia, Pa.; H E. Burke and A. N. Caudell, Washington, D. C.; E. P. Felt, Albany, N. Y.; F. W. Foxworthy, Ithaca, N. Y.; Otto Heidemann and W. E. Hinds, Washington, D. C.; Jas. S. Hine, Columbus, Ohio: A. D. Hopkins, Washington, D. C.; Chas. W. Johnson, Philadelphia, Pa.; W. G. Johnson, New York; Vernon L. Kellogg, Stanford University, Cal.; B. Pickman Mann and C. L. Marlatt, Washington, D. C.; Geo W. Martin, Nashville, Tenn.; Herbert Osborn, Columbus, Ohio; Raymond C. Osburn, New York; A. L. Quaintance, College Park, Md.; Wm. D. Richardson, Fredericksburg, Va.; E. A. Schwarz and C. B. Simpson, Washington, D. C.; Otto H. Swezey, Columbus, Ohio.

Mr. Schwarz called attention to the fact that the old Entomological Club was still in existence, and all that was necessary to put it in operation was to proceed to the election of three officers: President, Vice-President, and Secretary. On motion of Mr. Ashmead, Mr. Schwarz, one of the oldest members of the Club and the one most familiar with the organization, was nominated, and duly elected President of the Club for the ensuing year. On motion of Mr. Hopkins, Mr. Ashmead was duly elected to the office of Vice-President. On motion of Mr. Felt, Mr. Marlatt was elected Secretary of the Club.

Following the election of officers, a historical review of the Entomological Club of the A. A. A. S. was read by Mr. Schwarz, the different meetings of the Club being dwelt upon and described individually. It is deemed advisable to include this paper entire, as portion of the minutes of this meeting.

A Sketch of the History of the Entomological Club of the American Association.

BY E. A. SCHWARZ.

Since the majority of the Entomologists present at this meeting belong to a younger generation, who have never attended any of the meet-

ings of the old Entomological Club of the A. A. A. S., a short history of the Club may not be out of place on this occasion. These notes I have prepared from a hasty persual of the most readily available *entomological* literature, and more especially from the volumes of the CANADIAN ENTOMOLOGIST, to which periodical the Club is deeply indebted for the faithful preservation of its records through a long number of years.

The first movement looking toward the formation of a purely entomological organization within the A. A. A. S. took place at the 21st meeting of the Association, held at Dubuque, Iowa, August 21–27, 1872. No definite action was taken at that time, and the only record of this movement is preserved in the CAN. ENT., Vol. IV., 1872, p. 182.

In the following year the Association met at Portland, Me., and its proceedings, as far as entomology is concerned, were briefly reported by Mr. P. R. Uhler, elected to act as Secretary during the three meetings held by the entomologists on August 21st, 22nd and 23rd. The subject of forming a sub-section of entomology was then reconsidered, "but the number of entomological papers offered being so small, it was not then deemed advisable to go into sub-section." (CAN. ENT., Vol. V., 1873, p. 165.)

At the following meeting of the Association, held at Hartford, Conn., in August, 1874, an unusual number of Entomologists was brought together, and, after mature deliberation, it was resolved to organize under the name of "The Entomological Club of the A. A. A. S.," and the following constitution was adopted, which is printed in the CAN. ENT., Sept., 1874, p. 161.

[At the request of the President, the constitution was then read by the Secretary.]

In the year 1875 the first meeting of the Club was held in Detroit, Mich., on August 10th, President Dr. J. L. LeConte in the chair, Prof. C. V. Riley, Secretary, and the minutes of this meeting are published in the CAN. ENT., 1875, pp. 177–179.

The minutes of the meetings of the Club held in 1876 in Buffalo, N. Y., occupy nearly ten pages (pp. 176–185) in the CAN. ENT., and, for the first time, a short address of the President, Dr. J. L. LeConte, is published.

The records of the next meeting, held in Nashville, Tenn., are very meagre, on account of the absence of both the President and the Secretary, and occupy a little more than two pages in the CAN. ENT. for 1877 (pp. 172–174.)

The meetings of the Club held at St. Louis, Mo., in August, 1878, are fully reported upon in the CAN. ENT. of that year, and, for the first time, an elaborated address by the President, Dr. J. A. Lintner, on the progress of American Entomological Science, is published.

The same remarks hold true for the Saratoga, N. Y., meeting in 1879 (see CAN. ENT., pp. 163–177), and for the Boston, Mass., meeting, held in 1880 (see CAN. ENT., pp. 161–174). The minutes of the latter meeting were also published in the *Amer. Entomol.*, Vol. III., pp. 272–274, and pp. 284–286.

For the year 1881 the proceedings of our organization are published in the CAN. ENT., pp. 179–189, and pp. 214–216, and in *American Naturalist*, pp. —, under the heading, "Meeting of the Sub-section of the A. A. A. S.," Rev. J. G. Morris being President.

As a sub-section, the Entomologists of the A. A. A. S. do not seem to have been successful, for I fail to find any record of its meetings in 1882, when the A. A. A. S. met at Montreal, Can.

However, in 1883, when the Association met at Minneapolis, Minn., it was decided to reorganize the Entomological Club. The following officers were promptly elected: President, D. S. Kellicott; Vice-President, Herbert Osborn; Secretary, O. S. Westcott. A large number of valuable and interesting communications were presented, which are recorded in CAN. ENT. for 1883.

The 1884 meeting of the Club, held at Philadephia, Pa., was also a very successful one, as is apparent from the full record published in the CAN. ENT., pp. 169–179, and pp. 181–186, the Secretary of the Club being Mr. J. B. Smith.

The minutes of the Ann Arbor, Mich., meeting in 1885 were fully reported in Vol. I. of *Entomologica Americana*, and for the first time, papers read by members are printed in full in these records.

In Vol. II. of the same periodical we find published the minutes of the Buffalo, N. Y., meeting, held in August, 1886. In Vol. III. are the minutes of the New York meeting, held in August, 1887.

In spite of the fact that the Cleveland, O., meeting in 1888 was attended by a small number of Entomologists, a large number of valuable papers were read, besides an elaborate address of the President, Mr. John B. Smith, all of which is published in Vol. IV. of *Entomologica Americana*, while the CAN. ENT. also published a full account of the proceedings.

At the Toronto, Can., meeting of the Association, in 1889, which was

not very largely attended by the Entomologists, the Association of Official Economic Entomologists was founded, and held its first meeting in conjunction with the Entomological Club, the result being that most of the papers read were of an economic nature. The minutes are published both in the CAN. ENT. and in *Entomol. Amer.*

At the Indianapolis, Ind., meeting in 1890, the Entomological Club was again well represented, and a successful meeting was held, as can be seen from the very full account published in the CAN. ENT., while the *Entom. Amer.* brought out a short abstract.

The number of members of the Entomological Club present at the Washington, D. C., meeting in 1891 exceeded that at any previous meeting, and the full record of the proceedings occupies 48 pages in the CAN. ENT. of the same year.

The Rochester, N. Y., meeting in 1892 was also very successful, and its record fills 61 pages of the CAN. ENT. The following officers were elected for the next meeting: President, Rev. Chas. J. S. Bethune; Vice-President, Mr. H. G. Hubbard; Secretary, Mr. C. L. Marlatt; but this "next" meeting was never held, nor is there any record of any subsequent meeting of the Entomological Club of the A. A. A. S.

Following the reading of this communication and the constitution of the Club, the question of membership was brought up by Mr. Marlatt. The subject was discussed by Messrs. Bradley, Schwarz, Ashmead, Hopkins, Felt and Marlatt. Mr. Marlatt moved to make section three of the constitution read as follows: "All members of the American Association for the Advancement of Science who are interested in entomology, and all members of the Association of Economic Entomologists, shall be *ipso facto* members of the Club. Other Entomologists may be elected to membership at any regular meeting." This motion, seconded by Mr. Ashmead, was carried. On motion of Mr. Hopkins, the following provision was added to this section: "Members of local entomological societies at the meeting place of the American Association of any year shall be considered as members of the Club."

The business of reorganizing the Club having been completed, Mr. Kellogg was invited by the President to give a report on the entomological work done under his direction on the Pacific Coast.

Mr. Kellogg first called attention to a very creditable piece of monographic work on Aleurodes by one of his students, exhibiting some especially well-executed plates illustrating these insects. This work is soon to

be published. He exhibited also a pair of primary royalties of *Termopsis angusticollis*, the Pacific Coast Termite. He had found no difficulty in securing a number of these royal pairs, and one of them he had brought alive from California in some decaying wood. The true royalties of this kind are certainly very rare, and these forms excited much interest.

Mr. Kellogg followed with an account of his work with the Blepharoceridæ, a family of Diptera, which inhabit in the larval stage swift-running mountain streams. These Diptera have hitherto been considered very rare, and only fifteen species were known in the world—five of them in North America and six European, the remainder subtropical or tropical. To this number he had added four new species which he had studied in all stages, and added much to the information of the early stages, which had previously been little known. He described the manner of attachment of the larvæ to the rock beds in swift streams, the insect not occurring in still water, and gave an account of the habits of the larvæ, the remarkable specialization in the larval and pupal characters, and also the habits of the adults, together with some details of the structural peculiarities of the latter. He urged all collectors to be on the lookout for these curious insects. He reported that the results of his investigations were in press, and included a revision of the family in North America, giving full details of all his studies, and he promised to send this paper to any one interested in the subject. A miscellaneous discussion followed this communication, bearing on these Diptera, in which some additional facts and explanations were given by Mr. Kellogg. Concluding the discussion, Mr. Schwarz stated that he was not familiar with any matter contained in the *Entomologica Americana* bearing on these insects, but that in company with his late friend, Mr. Hubbard, and also later with Mr. Barber, he had made examinations covering two years in Arizona, and had never found an example of Blepharocera. He believed this to result from the fact that none of the mountain streams in Arizona can be called permanent. Every other season, at least, these streams dry up. Both Mr. Hubbard and himself, he stated, were well acquainted with these forms, and would have recognized them if they occurred there. The Simulium flies, on the other hand, maintained themselves under the conditions noted; in other words, they were able to live in these streams and to survive the dry period, by what means he was not able to discover.

Dr. Hopkins presented the following account of recent work in Forest-insect Entomology:

Forest-insect Explorations in the Summer of 1902.

[revised by dr. hopkins from the stenographic notes.]

Dr. Hopkins gave an account of his preliminary survey, during the past summer, of the forest regions of different sections of the country to determine the primary enemies of forest trees and locate the areas of principal depredations. Between July and November he was in 27 States and two territories. His first trip was made through the South-eastern States, to determine the area of a recent outbreak of *Dendroctonus frontalis*. He found in the southern Appalachian region that this, one of the most destructive insects of American coniferous forests, was commencing its ravages as it did a few years previous to the great devastation wrought by it in the Virginias. He spoke of the probability that some of these insects, which are for a long time exceedingly rare, then suddenly make their appearance in vast numbers, taking the character of an invasion, are varieties of the typical forms which, on account of favorable variations, are capable of extending their range into new areas, and also to overcome the resistance exerted by the living trees attacked by them, which could not be overcome by the typical forms. He gave as an example the results of his study of *Dendroctonus frontalis*, in which he found that the form which was so exceedingly common and destructive in the Virginias was a variety of the form described by Zimmerman many years ago.

After locating the trouble in the vicinity of Fletcher's and Tryon, N. C., he travelled southward through South Carolina and Georgia to Tampa, Florida, and returned by another route, to determine the extent of this new outbreak. Returning to Washington from this trip, he proceeded to the Black Hills, in South Dakota, where a vast amount of pine timber has been killed by *Dendroctonus ponderosæ*, as has been mentioned in Bulletin 32, new series, Division of Entomology. This species, he said, is another example of apparent variation from a western type, *D. monticola*, Hopk. MS. It has distinctive and constant characters of structure and habit which are sufficent to entitle it to the rank of a species, and he believes that it is possibly of recent development. *D. monticola* attacks the mountain pine *(Pinus monticola)* in Idaho, and the sugar pine *(P. Lambertiana)* in Oregon. The smaller size of this species, the more primitive character of its gallery, and its wider distribution, indicate that it is the stock from which *Dendroctonus ponderosæ* has sprung. The latter is apparently more restricted in its range, having been found only in the

Black Hills and in Northern Colorado. This is simply offered as a suggestion of the probabilities, and to call attention to this feature, which should be considered in future investigations.

From the Black Hills he went further west, through Wyoming and Montana to Spokane, Washington, thence to the Priest River Reserve, where he found *Dendroctonus monticola* doing considerable damage to *Pinus monticola* in the vicinity of Priest Lake. He also found *D. pseudotsugæ*, Hopk. MS., intimately associated with the dying of the large red fir (*Pseudotsuga taxifolia*). This latter species of Dendroctonus, he said, was one which for a long time had been confused with *D. similis*, Lec., but upon examination of the type of *D. similis* he found it to be quite a different thing, and undescribed, while *D. similis* is a synonym of *D. obesus*, Mann.

He found also the pine-defoliating butterfly occurred in considerable numbers, flying around the tops of the pine trees. The fact that this butterfly was almost exterminated by its parasites a few years ago, and is now apparently on the increase, suggests that it may again become destructive within a few years. Returning from Priest River, by the way of Spokane, he visited Sand Point, Idaho, where, in 1899, he discovered a young six-year-old entomologist, in whom he was very much interested. His name is Charley Boyers. From Sand Point he went to Seattle, and thence into the Cascade Mountain range, where, among other finds, he made the discovery of a large Prionus larva boring in the living sapwood of a red fir, which four or five years previous had been injured by fire, but not killed. This was of interest, from the fact that this species is not supposed to bore into the living sapwood of standing trees. He also spoke of the great windfalls in the forests of that region, and the extreme difficulty met with in penetrating the forests thus obstructed by the great trees lapping over each other, making it necessary sometimes to climb from one tree to another, until one was twenty or thirty feet from the ground. He also spoke of the rich field for the Scolytid specialist in these wind-felled trees, which were infested by many species; and spoke of such windfalls being the cause of serious depredations by insects which bred in them. Returning through Washington and Oregon to San Francisco, he found that the Phloeosinus mentioned by Mr. Fowler, under the name of *P. punctatus**, as destructive to the Lawson cypress, was not *punctatus*, but an undescribed species which he had found in a Cryptomeria when there

*Report of work of the Agr. Exp. Sta., Univ. of Calif., 1898–1901, Part I., page 80.

in 1899, and also in Sequoia. Going from San Francisco to Del Monte and Monterey, California, he found the same thing in living Lawson's cypress on the grounds at Del Monte, and especially abundant in the broken branches and recently-felled trees of the Monterey cypress in the original grove at Cypress Point. He thinks that the original home of the species is in the ancient grove, but it has been distributed further north with the tree, which has been extensively planted for hedges and as an ornamental tree. We have here another example of a beetle which in its original host plant and distribution is not destructive, but becomes so under different environments and with change of habit. He also found *Dendroctonus valens* working serious damage to the Monterey pine, and associated with it a number of species of Tomicus, Pityophthorus, etc., which appear to be causing considerable trouble. He mentioned also the timber which had been destroyed by fire, mentioned by Mr. Schwarz at a previous meeting, and spoke of the great number of beetles breeding in the injured trees and spreading their depredations into living ones. Returning from Monterey on the Santa Fe R. R., he visited Williams, Arizona, to examine a trouble there reported by Mr. Schwarz, which was causing the death of a considerable number of pine trees. This was found to be caused by *Dendroctonus approximatus*, Dietz., and also by two undescribed species of Dendroctonus, which are closely allied to *D. frontalis*. He found also that among the Pinon on the rim of the Grand Canon, and between there and Williams, individual trees were dying and infested with Tomicus and other bark beetles.

(To be continued.)

NEW ORIENTAL ALEURODIDÆ.

BY A. L. QUAINTANCE, COLLEGE PARK, MD.

Aleurodes Marlatti, n. sp.

Egg.—Size about .1 mm. × .2 mm., exclusive of stalk, which is quite short, holding egg in upright position on leaf; regularly elliptical in outline. Colour, dirty yellowish brown, as seen on leaf; under transmitted light, yellowish. Shell without markings or sculpturing of any kind.

Larva.— Broadly elliptical. Colour, except in first stage which is yellowish, brownish to brownish black, varying in some specimens to an iridescent blue black; in later stages, margined all around with a short, rather squarely-trimmed, white, waxy secretion, from the marginal wax

tubes. Margin of case plainly crenulated, the incisions between wax tubes shallow and acute, but furrowed somewhat entad, giving a fluted marginal area. Abdominal segments distinct, thoracic segments moderately so. There is a slight, rounded medio-dorsal ridge along abdomen. Vasiform orifice triangular; operculum subcordate; lingula well developed, subcapitate distally, the stalk rather narrow. A pair of moderate, whitish setæ project caudad from caudal end of case. Size of larva, probably in second stage, .63 mm. × .5 mm.

Pupa Case. — As seen on leaf, shiny jet black and considerably convex when fully developed. There is a short, uniform, rather squarely-trimmed, glassy waxen fringe all around from the marginal wax tubes. On dorsum of abdomen there is an interesting "top-shaped" outline, formed by a narrow, more or less continuous line of whitish waxy secretion. The cephalic end of the figure originates along first abdominal segment, the sides curving outward and caudad, but some narrowing, the lines passing on either side of the vasiform orifice, caudad of which they coalesce more or less, the figure terminating in an acute point at caudal end of case. Lines of wax along the sutures of the abdominal segments extend out laterally from the more central, top-shaped figure, the whole forming an interesting and characteristic pattern. On cephalic end of case there is an irregular ellipse of wax, marking approximately the head region of the pupa. This dorsal secretion is most evident in the more mature individuals, and may be more or less absent in the younger forms. There is a very distinct suture all around, which separates from the body proper the pronounced fluted marginal rim. This latter is inclined to the surface of the leaf at an angle of about 45 degrees. Size variable, but about 1.35 mm. × 1.1 mm., roundly elliptical in form. Abdominal segments distinct, and thoracic moderately so. On cephalic end of case the transparent, subreniform "eye spots" very distinct. Vasiform orifice triangular, subacute caudad. Operculum subcordate; lingula difficult to make out, but probably as in larva. From caudal end of orifice a distinct furrow extends back to caudal end of case. Margin crenulated all around, the incisions between wax tubes shallow and acute; on latero-cephalic margin of case, on each side, a single tubular pore, noticeably distinct from adjacent wax tubes. Pupa case of general type of *A. quercus-aquaticæ*, Quaint., from Florida.

Adult.—♀. Body yellowish, with sutures mostly blackish. Length about .83 mm.; fore wing, 1.2 mm. × .56 mm.; antennæ and legs usual.

Fore wings with two irregular, broken bands of reddish, each crossing wing about equidistant on each side of caudal flexure of vein. There is also a small central spot, almost caudad of flexure, and a more or less evident spot at tip of vein. A small, irregular spot also occurs caudad of veinlet, near base of wing.

♂. Very like female, but smaller. Penis and valves of genitalia rather slender, sickle-shaped and acute.

Specimens on orange; collected by Mr. C. L. Marlatt, Hakato, Japan, May 21, 1901. Adults bred out by Mr. Marlatt. This species was also taken at Kumomoto, Japan, by Mr. Marlatt, on May 17, 1901. Described from numerous specimens of eggs, larvæ and pupa-cases. Adults described from a few imperfect females and one male in balsam mounts. Types in U. S. National Museum.

Aleurodes spinifera, n. sp.

Egg.—Exclusive of stalk, .2 mm. long by about .1 mm. wide; yellowish, curved, and marked with rather minute, closely-set polygonal areas. Stalk quite short, holding egg in more or less upright position on leaf.

Larva.—Regularly elliptical, appearing brownish on leaf, varying to black, with evident, but short, cottony fringe of wax all around from marginal wax tubes; dorsum without secretion. Size, probably in second stage, about .4 mm. × .3 mm. Margin distinctly crenulated all around, incisions between wax tubes short and acute. Abdominal segments quite distinct, thoracic less so. Dorsum set with very strong, heavy spines as follows: a row on each side about equidistant between the median longitudinal dorsal line and margin of case, of seven spines each or fourteen in all. Eight of these occur on the abdomen and six on the thorax. More centrally on the thorax are six equally developed spines in pairs. Vasiform orifice, which is somewhat elevated on a subconical, truncated protuberance, subcircular in outline; operculum subcircular to subcordate, nearly filling orifice. Lingula short, nearly obsolete.

Pupa Case.—As seen on leaf, with reflected light, jet black, considerably convex, the strong, dark spines plainly evident. Dorsum without secretion, but there is a compact, short, cottony fringe all around from marginal wax tubes. Size of mature specimens about 1.33 mm. × 1 mm., roundly elliptical in shape. On dorsum there is a submarginal row all around of strong, dark, acute spines, projecting considerable above and beyond case, nine or ten on each side. There is also a subdorsal row

on each side of strong, similarly-coloured, but shorter, spines, ten to twelve in number; nearer the medio-dorsal line there are four pairs of spines on the thorax, and a pair on abdominal segments 1, 2, 3 and 7, respectively. Vasiform orifice prominently elevated on an oblique, subconical, truncated protuberance, the subcordate orifice opening directly upwards. The operculum is similar in shape to orifice, which it nearly fills. Lingula obscure. There is a narrow, more or less evident marginal rim, composed of the prominent wax tubes, which are bluntly rounded distally, the incisions between them being moderately deep and acute On ventral surface rudimentary legs may be readily distinguished.

Adults unknown.

Specimens collected by Mr. C. L. Marlatt, Garolt, Java, December 7, 1901, on *Citrus*, sp., and Rose. Eggs and pupal stages described from numerous specimens; larvæ from two specimens. This species is closely related to Maskell's *piperis* from Ceylon, but differs in the number and arrangement of spines in the vasiform orifice, and in the fact that the eggs of *spinifera* are distinctly marked with polygonal areas, whereas those of *piperis* are striated. Types in U. S. National Museum.

TWO REMARKABLE NEW COCCIDÆ.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. M.

Of the two Coccidæ now described, the first is the type of a very peculiar new genus; the other is a very beautiful and interesting lac-insect.

Stictococcus, n. g.—An aberrant genus of Lecaniinæ, with the anal orifice in the middle of the back, not connected with the hind margin by a slit or groove. Anal ring with six hairs in larva; none in adult. Anal plates so modified in adult as to be unrecognizable. Legs small, but well developed. Antennæ with 5 or 6 joints. Margin with long bristles, and flattened bifid or palmate plates or spines. Dorsum with numerous large pits.

Stictococcus Sjostedti, n. sp. (T. D. A. & W. P. Ckll.).

Numerous on small branches. Oval, flattish, about 4 mm. long, 3 broad, and 1½ high; *Lecanium*-like, smooth and shiny, ferruginous to olive-brown; anal orifice in middle of back; dorsal region with two longitudinal rows of large round pits, single and (in two cases) two together: thus, 1, 1, 2, 1, 2, 1, 1, and then a single one in the middle line where the two rows converge. Subdorsal region with a row on each side

of similar, but smaller, pits, about ten in number, no two close together; sides abruptly descending, with submarginal and marginal rows of pits, the submarginal quite large, the others very small. Margin with scattered hairs. On the under side is a small amount of mealy secretion, arranged in radiating lines upon the sides of the abdomen. In some specimens the back is more or less coated with an easily deciduous waxy material.

Mouth-parts small, labium rounded. Margin with long bristles, and numerous very broad and rather short palmated or bifid plates. Antennæ stout, very small and pale, 5-jointed, with a long 3, or 6-jointed by the division of 3, in which case 4 is longer than 3, being a trifle longer than broad, while 3 is conspicuously broader than long. Legs stout, small and pale; tarsus and tibia subequal, but tarsus a little the longer; claw large, strongly hooked. Anal orifice dark brown, consisting of a circular chitinous plate, in which is a large quadrangular opening filled by two subquadrangular plates, each of which has on its surface a pair of darkened rounded processes or lobes, and also a pair of foramina, the foramina of the anterior plate near its anterior margin, and those of the posterior plate near its posterior margin. The hind margin of the anterior plate is concave, leaving a slit between the two. No bristles are apparent. Skin with many minute circular gland orifices. Ventral surface in the abdominal region with a transverse fold fringed with hairs.

Larva (from body of ♀) broad-oval, with a similar dorsal anal orifice, but it is surrounded by the six long bristles of the anal ring. The anterior plate, which bears these bristles, is horseshoe-shaped, with the opening directed backwards, and into the opening falls the more or less oval posterior plate, which is longitudinally divided in the middle line, and no doubt represents the anal lobes. Margin with bristles and large flattened bifid or trifid plates as in the adult, only they are much larger in comparison with the size of the insect. Antennæ stout.

Hab.—Cameroons, W. Africa; very numerous specimens in alcohol, collected by Dr. Yngve Sjöstedt, of the Naturhistoriska Riksmuseum at Stockholm. Several of the bottles are only labeled as from the Cameroons; a few contain more exact labels—"Itoki, Feb., 1891"; "Eskundu," and "Bonze." This is the first Coccid on record from the Cameroons.

Tachardia aurantiaca, n. sp.

On bark of branch; scales usually separate, sometimes coalescing, round, seen from above, 4 mm. long, convex, but flattened dorsally,

so that they are not half as high as broad; surface thrown more or less into concentric folds; colour bright orange; median dorsal area ferruginous, with radiating ridges and the usual orifices, the minutely transversely ribbed larval exuvia in the middle. Young, up to about 2 mm. long, orange-ferruginous, with rather obscure radiating ridges.

Second stage: female with the cephalothoracic end narrower than the abdominal, and with a constriction between the thorax and abdomen. Abdomen emarginate posteriorly, as in the same stage of *T. Mexicana*. No spine found. A couple of pale ferruginous (chitinous) triangular plates, each presenting near the middle a round patch of greatly crowded and very numerous gland-orifices, each of which under a high power exhibits a central nucleus, from which radiate five lines. Near one corner of the triangular plate is a smaller patch of similar orifices, here about twelve in number. Anal ring with ten long bristles; the ring is transversely oval, and is divided into an anterior and a posterior part. The anterior part, bearing four bristles, is deeply notched in the middle anteriorly; the posterior part, bearing six bristles, is deeply notched in the middle posteriorly. The lac is very hard to dissolve. The insects show the usual crimson pigment.

Hab.—Garoet, Java, Dec. 7, 1901, on grape-fruit *(Citrus);* collected by Mr. C. L. Marlatt. The second-stage females are attacked by a parasitic fungus, their bodies being full of the threads in some instances. The adults show large parasite holes, and what the parasites have left has been almost entirely consumed by a host of small hairy mites, evidently a species of *Tyroglyphus*, as they agree well with Fig. 54 in Marlatt, Bull. 14, N. S., Div. Ent., Dep. Agr. (1898), p. 103. Owing to these conditions I was unable to obtain a good specimen of the female adult for mounting.

The species is easily known from *T. decorella* by the absence of ribbing beyond the second stage.

A CONTRIBUTION.

Mr. E. P. Venables, Vernon, B. C., thoughtfully considering the needs of the Society, has donated to it some British Columbia beetles, the most of which are new to its collection, thus increasing by so much its powers of usefulness to others for the determination of specimens.

J. Alston Moffat, Curator.

NEW COLEOPTERA FROM THE WESTERN UNITED STATES.

BY H. F. WICKHAM, IOWA CITY, IOWA.

All of the species described in the following pages belong to genera which are of small extent or have been recently monographed, and it is hoped that no confusion will result from their publication. The types are in my own collection, and, unless otherwise credited, were captured by myself.

PHYSORHINUS, Esch.

Hitherto the only species of this genus known from the United States was *P. fusculus*, Champ. (*Anchastus frontalis*, Horn), and the curious pale head, which Dr. Horn thought might be accidental, is, according to Mr. Champion, characteristic of the genus, which is well represented in Central America. I have in my collection a form which seems to be new.

P. yuccæ, n. sp.—Elongate, subfusiform, convex, shining, clothed with rather dense yellowish pubescence; castaneous, legs rather lighter. Head yellow, clypeal margin blackish, the surface deeply but somewhat finely punctate; antennæ passing the hind angles of the thorax, second joint extremely small, third barely longer, together about equal to the fourth. Prothorax a little wider than long, broadest behind the middle, rapidly narrowing to apex, sides nearly parallel behind, hind angles just perceptibly divergent, acute, bicarinate, the inner carina straight, oblique, outer one very slightly curved and quite near the margin; surface deeply and densely but not very coarsely punctured, the punctuation of the neighbourhood of the anterior angles being the coarsest. Elytra at base not as wide as the thorax, becoming rapidly narrower from a point much in advance of the middle, sides slightly rounding, apices distinctly finely serrulate, tips conjointly rounded, all the striæ distinct, but fine, with small distant punctures at bottom, interstrial spaces finely, irregularly and rather closely punctate. Beneath somewhat finely and closely punctured. Dilated portion of posterior coxal plates rounded at tip. Length 11 mm.

Taken near Brownsville, Texas, by C. H. T. Townsend and myself, in heads of Yucca during July. Differs from *P. fusculus* by the closely punctured head. It is quite closely allied to the Mexican *P. frontalis*, Cand. The Central American species are said by Champion to occur mostly in forest clearings, and are collected by beating branches of trees.

CHRYSOBOTHRIS, Esch.

C. Piuta, n. sp.—Form oblong, subdepressed, bronzed, shining, head bright reddish cupreous, front green; pronotum reddish cupreous,

bluish at base ; elytra bronzed, but much less brilliant than the thorax, the basal half, excepting the sutural and lateral margins and foveæ, dark bluish and more opaque ; body beneath dark bronze, with whitish pubescence, which forms denser patches on the meso- and metathoracic side pieces and on the sides of the ventral segments. Antennæ greenish-bronze, slightly more slender to tip, third joint scarcely equal to the next two. Front deeply and quite regularly punctured, the punctures separated by about their own diameters, callosities indistinct, pubescence whitish, conspicuous. Clypeus broadly and obtusely triangularly emarginate, angles of emargination not rounded. Thorax about one-half broader than long, front margin slightly bisinuate when viewed from above, anterior angles obtuse, slightly rounded, sides nearly straight, but converging a trifle to near the base, whence they are suddenly sinuately narrowed to the hind angles ; disc convex, regular, the punctuation deep, well separated at middle, but becoming coarser and more crowded near the lateral margins and at sides of base, where it appears substrigose, but is scarcely confluent, median line obliterated in front, the posterior half smooth and shining, not impressed nor channelled. Elytra distinctly wider than the thorax, sides nearly parallel to about the apical third, whence they are narrowed to the separately rounded tips, serrations fine, numerous ; costæ obliterated, except the exterior one, which is distinct on the humerus and near the middle of its length, but becomes evanescent behind ; impressions deep, arranged thus : a basal bronzed rounded one on each side of the scutellum, exterior to which is a shallower crescentic mark, not bronzed, extending from just within the humeral prominence to the suture. Behind this is a transverse bronzed indentation, wider externally, reaching nearly to the suture, while still posterior to this is another less distinct impression, which fades gradually into the cupreous area behind it. The punctuation of the elytral disc is fairly deep and well defined, but becomes scabrous at sides and towards the tips. Body beneath densely punctured, except on the median area of the abdomen, which is more shining. Prosternum lobed, hairy, without median smooth space. Last ventral with serrulate margin, coarsely, closely punctured, tip with a rounded emargination. Anterior tibiæ with apical dilatation about as in *mali*, tooth of femur indistinctly serrulate, middle tibiæ slightly arcuate, not angularly sinuate within, hind tibiæ straight. Length, 6.5 mm.

This species belongs in Horn's group IV., and may be placed near *mali*, from which it differs by the usually small size, contrasting colours,

obliteration of the frontal chevrons and elytral costæ, the non-sulcation of the median thoracic line and by other characters. The description is drawn up from a male; the female differs thus: last ventral broadly triangularly emarginate, with an indication of a lobe in the bottom of the emargination, as in *chrysoela;* however, this structure is a trifle unsymmetrical, and may be accidental. The prosternum is more coarsely punctured and less hairy than in the male, the anterior tibiæ are not dilated at tip, and the middle tibiæ are straight, while the front of the head is entirely cupreous.

The name refers to the tribe of Indians inhabiting the neighbourhood from which the beetle came. The type was taken with two other slightly smaller specimens, by beating desert shrubs near Independence, in Owen's Valley, California, during the month of July. A female from Williams, Arizona, is somewhat more strongly sculptured, and the under side of the body is bluish.

AGRILUS, Steph.

The species described below seem to be well marked and easily recognizable, and thus worth describing separately. It is probable that the impetus given to the study of the genus through Dr. Horn's monograph will result in the detection of a number of undescribed forms.

A. pinalicus, n. sp. — Rather more robust and less narrowed behind than usual. Head, thorax and scutellum blue-black; elytra metallic green, with a dark sutural stripe. Antennæ short, blackish, serrations beginning on the fourth joint. Front of head deeply and broadly channelled, the sulcus extending from the occiput on to the clypeus, the bottom clothed with close, snow-white pubescence; surface of head granulate behind the eyes, the remainder, where visible, transversely rugose. Thorax broader than long, wider in front of the middle margin, sinuous in lateral view; surface somewhat irregularly convex, closely strigose, the strigæ transverse in front, oblique near the base and over most of the disc, longitudinal near the sides; median line fine, distinct near the base, interrupted about the middle; sides slightly arcuate, sinuate near the base, hind angles nearly rectangular, not carinate, front angles with a longitudinal spot of white pubescence, which diverges a little from the margin posteriorly and does not reach the middle of its length. Scutellum rough, not carinate. Elytra with the sides sinuate, apices separately rounded, margin serrulate posteriorly, surface granulate, a snow-white spot of pubescence on each side near the scutellum, which

may possibly extend at times down the dark sutural space described above, as this region shows evidence of scales in places; costa obliterated. Body beneath almost entirely concealed by white pubescence, the exposed portions imbricate-punctate, the abdomen more finely so. Last ventral serrate at sides. Pygidium with a projecting carina, which is truncate at tip. Legs sparsely pubescent. Length, 9 mm.

The type is a female taken in October at Parker's Well, on the eastern side of the Organ Mountains, New Mexico, by Theo. D. A. Cockerell, and bears his number, 5295. Another specimen which I collected during June, in the Pinal Mountains, Arizona, differs in colour, the head being cupreous, the elytra red-bronze with green sutural space. The under side of the body and the legs are also brightly bronzed, the pleura and margins of the ventral segments darker. In other respects the two correspond.

This beetle belongs near *Agrilus audax*, Horn, but differs in having a non-carinate scutellum and by the arrangement of the pubescence. The claws are sharply and strongly toothed beyond the middle, the inner division not notably inflexed.

A. mercurius, n. sp.—Rather robust, olivaceous bronze; elytra and thorax vittate with white pubescence. Head coarsely and confluently punctured, front covered with rather long white hairs, median line faint. Antennæ passing the middle of the thorax, serrate from the fifth joint. Thorax broader than long, sides arcuate, but less so than in *blandus*, sinuate in front of the hind angles, which are not carinate, disc gibbous, a faint depression posteriorly in place of the median line, surface coarsely, densely punctate, forming more or less distinct concentric strigæ, which are stronger anteriorly, margin sinuous in profile; on each side is a large spot of white pubescence, beginning at the anterior angle and extending to behind the middle, this spot confluent above with a longitudinal stripe of the same colour, which extends from a point on the thoracic disc opposite the apex of the gibbosity to base, where it meets the elytral vitta. Scutellum not carinate. Elytra not covering the sides and tip of abdomen, coarsely scabro-punctate, not costate, margin serrulate posteriorly, apices obtuse, disc of each elytron with a vitta of perfectly white pubescence extending from base, where it is confluent with the corresponding thoracic stripe, to the apex. Pygidium with a fine carina, which does not project. Prosternal lobe well developed, with a broad, slightly indented, rounded emargination on front margin, prosternum densely clothed with white

hairs ; the prosternal, mesosternal and metasternal side pieces are densely pubescent with white, as is also the vertical portion of the ventral segments. there being in addition a row of four rounded spots of the same colour and nature on each side of the abdominal region. The visible portions of the under surface are distinctly imbricately punctate. Claws with a rather broad, sharp tooth, which is not notably inflexed. Length, 6 mm.

Allied to *A. blandus*, Horn, from which the gibbous pronotum and non-carinate scutellum will separate it. It rather closely approaches *A. gibbicollis*, Fall, but may be distinguished by the emarginate prosternum, non-carinate thoracic angles, and presumably by the ornamentation, as Fall makes no mention of discal thoracic vittæ, nor of lateral abdominal spots inside of the vertical stripe.

The type was taken by myself at Deming, New Mexico, August 18, and is apparently a male. The first and second ventrals are vaguely longitudinally impressed at middle.

EUGASTRA, Lec.

In describing a species under the above generic caption, I do not wish to be understood as favoring the separation of *Eugastra* from *Lachnosterna* because of any supposed great structural differences. I am merely following the example of Mr. Bates, who, in the Biologia Centrali-Americana, expresses the opinion that on account of the unwieldy size of the old genus *Lachnosterna*, it is advisable to retain certain names to indicate more or less well-defined groups, which may eventually be limited in some more satisfactory manner than is possible at present.

E. epigæa, n. sp.—Subovate, obtuse behind, convex, nearly black, slightly shining. Clypeus barely perceptibly emarginate in front in the male, more distinctly so in the female, densely, deeply and coarsely punctured, margin reflexed ; front punctured like the clypeus, occiput less strongly. Thorax about one-half broader than long, widest about the middle, which is rather sharply rounded, almost subangulate ; margin coarsely serrate, sparsely fimbriate ; surface coarsely, somewhat deeply punctured, densely in the neighbourhood of the anterior angles, more sparsely and irregularly on the disc, where smooth spaces are left ; median line obliterated. Scutellum shorter in the female than in the male, subtriangular in the latter sex, a few large serial punctures along the sides. Elytra with basal margin a little elevated on each side of the scutellum, form broadly oval, surface even, not sulcate or costate, except that the longitudinal line on each side of the suture is well marked ; disc with

rather large, deep, coarse punctures, which are separated by about their own diameters, but become finer and shallower at sides and towards the tip. Pygidium alutaceous, not distinctly punctured, though large, sparsely placed, shallow punctures are indistinctly indicated. Sterna coarsely, not very closely, punctate; metasternal hairs extremely short and sparse. Abdomen rather indistinctly and much more finely punctured. Legs stout, claws arcuate. Length, 12.5–14 mm.

Male: Body winged. Antennal club shorter than the funiculus. Abdomen broadly, vaguely impressed at middle. Spurs of posterior tibiæ slender, curved, free; hind tarsi slender, much longer than the tibiæ. Claws not or barely perceptibly toothed.

Female: Body apterous. Antennal club a little smaller. Abdomen more convex, without median impression. Posterior tibial spurs broader; hind tarsi shorter than in the male. All of the claws are toothed, the tooth being short, sharp and erect, nearer the base than the apex.

This insect occurs occasionally, crawling on the ground, at Del Rio, Alpine and Marfa, Texas, during June, July and August. It belongs near *E. cribrosa*, Lec., but is distinct by numerous characters.

OLOGLYPTUS, Lacordaire.

It is well known that our common *Ologlyptus anastomosis*, Say, varies considerably in size and outline, as well as in the distinctness of the elytral costæ. Besides a considerable series of that insect from Kansas, Colorado, Texas, New Mexico and Arizona, I have in my cabinet another species which seems to be quite different from any of the Mexican forms described by Champion in the Biologia Centrali-Americana. It may be recognized by the characters noted below.

O. Texanus, n. sp.—Blackish, covered with yellowish scales. Rather elongate, somewhat flattened above. Head covered with yellowish scales, which completely conceal the sculpture, antennæ much heavier than in *O. anastomosis*. Thorax transverse, broadest at about the middle, disc convex, bifoveate, a fine distinct median carina, which is bifurcate at base, lateral margin thickened, explanate, and rather widely reflexed; the anterior margin is deeply emarginate, the base slightly bisinuate, sides very strongly rounded, more suddenly so posteriorly, a strong constriction in front of the hind angles, which are distinctly acute and rather prominent; front angles acute, feebly rounded. Elytra about as wide as the broadest part of the thorax, almost parallel to a point about one third from the tip, thence suddenly sinuately narrowed,

apices conjointly rounded. The suture is elevated posteriorly, costæ three in number, arranged thus: first nearly straight, parallel to the suture, reaching the base but abbreviated at apex; second parallel to the first, slightly shorter at each end; third forming an overhanging margin to elytron, until it reaches a point just beyond the tip of the second, when it curves in and becomes discal, but fades out before attaining the elytral apex. None of the costæ are confluent at any point. Body beneath with large scale-bearing punctures, distant on the abdomen, but more approximate on the thoracic segments. Legs densely scaly and comparatively stouter than in *anastomosis*. Length, 9 mm.

This beetle can be separated from *O. anastomosis* at a glance, the thoracic characters alone being amply sufficient for its differentiation, while the elytra are unlike those of the former species in shape as well as in ornamentation. From the antennæ alone, one might doubt the propriety of the generic reference, but the deflexed apex of the prosternum excludes the insect from *Astrotus*. The type was taken in Cameron County, Texas, during the month of September, by Frank B. Armstrong.

PYROTA, Lec.

Several years ago I received specimens of a beetle belonging to the above genus, which, by its antennal characters, approaches *Cantharis*, recalling in its general appearance *C. bigutatta*, though, of course, not to a deceptive degree. After a study of the material, I concluded that the species was undescribed, and wrote to Dr. Geo. H. Horn, asking his opinion. This coincided with my own, and as the insect seems to have been taken in some abundance, and is probably represented in numerous collections, I propose to name it after the State in which it occurs.

P. Dakotana, n. sp.—Elongate, head and thorax shining, elytra much less so. Above yellow, thorax with two small blackish discal spots, one on each side of the middle line; elytra each with a narrow, nearly straight longitudinal blackish stripe, which does not reach the apex nor the base, and is somewhat more distant from the suture than from the lateral margin. Head yellow, sparsely, irregularly and rather coarsely punctured; sides behind the eyes almost exactly parallel for a short distance; hind angles broadly rounded. Antennæ shorter and stouter than usual, blackish, first joint paler at base, third joint longer than the fourth. Palpi blackish. Thorax campanulate, widest behind the middle, sides rounded, less so anteriorly, where they are rapidly convergent; basal

margin elevated ; disc irregularly punctate, a rather large fovea in front of the scutellum. Scutellum yellow. Elytra distinctly scabrous, subopaque to the naked eye, shining under a lens, finely sparsely pubescent ; costæ faintly indicated. Body beneath alutaceous, very finely scabrous, the meso- and metathoracic regions rougher than the rest. Legs yellow, knees, tips of tibiæ and tarsi blackish. Length, 10 to 12 mm.

Eight specimens are before me, all taken at Pierre, South Dakota, by the late P. C. Truman. The principal variation in markings consists of a tendency to loss of the elytral stripe, although one strongly-developed specimen, with the vitta well marked, has the suture dark for the greater part of its length. The under surface of the body is always more or less blackish, sometimes almost entirely so except the prothoracic region, which remains yellow. In one case, the anterior tibiæ are blackish to base. By the form of the head, this insect is allied to *P. insulata* and *P. Germari*, being close to the latter in several respects, but *Dakotana* has shorter and thicker antennæ. The style of ornamentation and the opacity of the elytra will at once distinguish it from *bilineata*. The maxillary palpi are not deformed in the male, the last joint being but slightly modified.

MY LAST REPLY TO MAJOR CASEY.

BY E. WASMANN, S. J., LUXEMBURG.

In Dr. David Sharp's "Zoological Record, Insects," 1901, I find in the list of my publications of that year, under the title, 1449, "*On some genera of Staphylinidæ described by Thos. L. Casey*," the following note : "*Casey replies to this, l. c., pp. 312, 313.*"

As I do not receive American journals here, I tried to get the respective nos. of the CANADIAN ENTOMOLOGIST from one of my friends. Being informed now of the contents of Major Casey's "reply," I understand why he did not send it to me, although I had sent him a copy of my critic paper "*On some genera of Staphylinidæ*" already, Nov. 2nd, 1901.

The manner in which Major Casey has treated our scientific controversy differs far from my own in the article cited above (CANAD. ENTOM., Sept., 1901, p. 249–252). In an angry tone he reproaches me of "disingenuousness," "narrow-mindedness," etc.; he even tries to misinterpret my own personal correspondence with him in a way quite new in scientific discussion.

The psychological connection of my cards written to Major Casey, from March to June, 1901, is very simple, and I wonder why Major Casey did not find it out himself. The paper containing his new note on the genera *Homœusa*, *Myrmobiota* and *Soliusa* was entitled "*Review of the American Corylophidæ, Cryptophagidæ, Tritomidæ and Dermistidæ, with other studies*," comprising 121 pages. I informed him on March 5th of the receipt of this paper, without suspecting that it contained something about *Homœusa* and *Myrmobiota*. Only myrmocophilous genera being of special interest for me, I did not examine more closely Major Casey's ample paper on *Corylophidæ*, etc.; therefore, when I asked Major Casey again (June 1st) to send me his last paper, where he explained the differences of *Homœusa* and *Myrmobiota*, it was not necessary for him to send me a second copy of his paper on *Corylophidæ*, etc., but he might have simply informed me that the paper in question was pp. 53–55 of his study on *Corylophidæ*. Instead of falling on this very simple explanation of the appearing contradiction in my cards, Major Casey has given them a rather injurious interpretation, which I much regret for Major Casey's own sake.

ARATUS LUTEOLUS, N. SP.

BY REV. THOMAS W. FYLES, LEVIS, QUEBEC.

Length, .35 inch. Head dark fawn colour, scabrous, much prolonged between the antennæ, the prolongation suggestive of the nose of the moose. Eyes upon rounded elevations, black and protuberant. The antennary spine stout, sharp and projecting. Antennæ reddish brown above, olivaceous beneath; the joint next the spine distinct and square cut and of greater diameter than that following it. Beak black, long, extending between the front legs. Prothorax dark umber in colour, concave in front, the concavity ending on either side with a short spine. From the bases of these spines the sides (which are finely denticulated) run direct to the widest part of the prothorax; from thence they are rounded to the back, forming a pair of clay-yellow epaulets, which extend beyond the slightly-curved remainder of the back line. Down the middle of the prothorax are two *carinæ*, nearly parallel, extending from back to front. The shield is narrow at the base, and runs back to an acute angle; its margins are reflexed. The costal edge of each elytron forms a double curve: it is first convex and then slightly concave. The corium is broad at the base, narrowed beyond the shield, and rounded at the tips. It is

strongly ribbed, and is clay-yellow in colour, mottled with fulvous, and is darker towards the tips. The membrane is roseate brown, and has a yellow patch on the costa and another at the base. The legs are reddish brown above and olivaceous beneath, paler at the joints; the thighs are but slightly dilated. The abdomen is ovate, flattened, and extends beyond the elytra. It is of a roseate brown. On either side of it are six sutures marked with yellow. The anal segment ends in a pair of incurved lobes. The whole of the under side is lighter in colour than the upper.

Taken at Quebec.

A NEW ANAPHORID, AND A NOTE ON AN OLD ONE.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Eulepiste Kearfotti, n. sp.

Gray, with a reddish ochreous tint, brighter in an obscure streak beyond cell and on submedian fold. A series of black strigæ along the costa and on fringe: a small dash beyond cell, and an oblique bar in submedian fold beyond middle. Hind wing blackish, fringe long, pale, interlined with blackish. Below, blackish, with a pale line at the base of the fringe. Expanse, 22 mm.

Two males from Mr. W. D. Kearfott's collection, "Yuma Co., Ariz. Desert."

Larger than the other species of Eulepiste, and differing in the genitalia. Uncus a single long spine, curving downward, opposed to a broad, concave basal plate. Side pieces strap-shaped or slightly concave, curved downward, and with a distinct spine on the lower angle.

U. S. National Museum, type No. 6734.

Pseudanaphora mora, Grote.

In 1895 Lord Walsingham examined Grote's type in the British Museum, and thought it might be the female of *P. arcanella*, Clem., overlooking the description of the true female of this species by Beutenmuller (Ent. Amer. IV., 29, 1888). I have now before me ten females and eight males of *mora* from localities in New York, Pennsylvania and the District of Columbia, a majority of them taken by Mr. F. A. Merrick, at New Brighton, Pa. (see Proc. Ent. Soc., Wash., V. 40, 1902). There is a marked sexual dimorphism, the male being nearly uniformly blackish, and the female of a light ochreous ground colour. The species is very distinct from *arcanella*.

NOTE ON CTENUCHA CRESSONANA AND VENOSA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

In Sir George Hampson's volume on the Syntomids, Cat. Lep. Phalænæ, Vol. I., London, 1898, *Ctenucha Cressonana* is referred as a synonym to *C. venosa*, but erroneously so. Both species inhabit our North American territory, but *C. venosa* has the wider and more southern range, extending probably from Arizona, through Mexico, into South America. I know *C. Cressonana* from Colorado and New Mexico only; this larger form is also variable in the colours of the stripes of the wing, whereas *C. venosa* is quite constant, so far as the examples I have been able to examine are concerned. I give here the comparative descriptions of the two species:

Ctenucha venosa, Walker. Brit. Mus. Lists Lep., II., 284 (1854).

Smaller, averaging 38 mil. in expanse; two terminal joints of palpi brownish black, basal joint orange red. Costa of primaries striped with yellow ochre, shading into white over apical third; a similar stripe over *M* 1, not reaching margin. Cubitus and the fork of *M* 2 and 3 striped with the same shade, as well as an internal stripe over *A* 2. Fringes white, broadly interrupted with brownish black at the middle on both wings.

The material in B. Mus. is probably all *C. venosa*,

Ctenucha Cressonana, Grote. Proc. Ent. Soc., Phil., II., 64 (1863).

Larger, averaging 45 mil. in expanse. Antennæ more lengthily pectinate; only the terminal joint of palpi brownish black, the rest orange red. Costa of primaries striped with yellow ochre, hardly paler towards tips. No stripe on *M* 1: at most, in one specimen, a very faint and narrow indication. Fringes entirely white, at base showing some scattered black scales not medially interrupted.

Typical form: stripes on primaries pure white; costa ochre yellow.

var. lutea, Grote: stripes ochre yellow; costa orange red.

It has been suggested to me in a letter that *C. sanguinaria* is a form of *C. Cressonana* with the stripes scarlet. I have not seen this latter species, which appears to be a still larger form.

A NEW BUTTERFLY FROM TEXAS.

BY G. M. DODGE, LOUISIANA, MO.

Nisoniades Llano, n. sp.

Expanse about one inch. Primaries with inner two-thirds black, marked by a triangular brown patch near base, resting on internal margin; a large similarly-coloured patch at outer end of cell, touching the costa, and bordered by a pale-brown line, which, starting from the costa about one-third of the distance from the apex, curves outward opposite the discal cell, and runs diagonally across to about the middle of the inner margin, and is twinned at its lower extremity by a similar line, which precedes it, and extends from inner margin to just across the median vein.

The outer third of the wing is crossed by two bluish-gray, curved bands, the inner being about twice the width of the other. They are separated by a narrow dark line. The outer band seems to be composed of small whitish spots, but that and the fringe are covered by bluish-gray scales. At the inner angle the fringe is slightly tipped with white.

The posteriors are crossed by an irregularly-curved band of large diffuse pale spots submarginally. A short row of similar spots lies across the discal area, and two or three such spots appear between this last and the base. The wing is thus transversely divided into three dark and three light spaces or bands. The fringe is white, dusky at the angles, and with black spots on its base at the extremity of the veins. Below, the primaries are dark, with a single small, but conspicuous, white spot near apex, between the second and third subcostal nervures. A regularly-curved band of pale spots corresponds to the broad band above, and beyond this is a terminal row of small, somewhat indistinct, spots. The fringe is dark, with white at inner angle and some white spots along its base, extending in a row nearly to the apex. Secondaries marked as above, but the spots are smaller, better defined, and do not give the wing the banded appearance so conspicuous on the upper side.

One example, Llano County, Texas.

Mailed February 28th, 1903.

The Canadian Entomologist.

VOL. XXXV. LONDON, APRIL, 1903. No. 4

THE ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

(Continued from page 61.)

Friday Evening, January 2, 1903.

The Entomological Club of the A. A. A. S. was called together for its second regular session on Friday evening at 7.30 o'clock, in the Columbia Law School, with the President, Mr. Schwarz, in the chair, and the following members present: Messrs. Althouse, Barber, Bradley, Burke, Currie, Hines, Hopkins, Mann, Marlatt, Herbert Osborn, Osburn, Quaintance, Webb. The minutes of the last meeting were read and approved. The President called on Mr. Marlatt for some entomological notes, and the latter responded by giving an account of an entomological collecting trip on a tour of investigation made in the interior of China, west of Shanghai, on a house-boat, in the late autumn of 1901.

A House-boat Collecting Trip in China.

BY C. L. MARLATT.

Mr. President, I can give you some account of conditions in China, partly entomological. This is an informal meeting, with no set programme, and what I shall present will not necessarily relate to insects. I had some very interesting experiences in China, and perhaps the most interesting of these was a trip that I made on a house-boat into the interior from Shanghai. I have alluded to this trip on one or two earlier occasions without having gone at all into detail. The trip was an entomological exploration, but the entomological features were not very rich.

The region explored in this trip is the flat country lying between the Yang-tse river and the Bay of Hangchow and the great interior lake, Ta-Hu. It included a trip up the Whang-Poo river, on which Shanghai is situated, to its head waters, where it is continued in the considerable canal, passing several Chinese cities of some importance until the Grand Canal is reached at Ka-Shing. From this point the Grand Canal was followed as far as Samen, and then a detour was made through smaller interior canals to Haining, a considerable town tributary and in sight of Hang-

chow. The return trip was made over substantially the same route. All of the territory explored lies in the upper half of the province of Che-Kiang.

The Boxer troubles were all confined to three northern provinces about Peking. The region which I explored in this house-boat trip was not in the range of the Boxer difficulty, nevertheless the Chinese everywhere were more or less savage over the results of the foreign invasions—rightly so, I think -and while in the central and southern provinces they were not openly hostile, they were not exactly kindly disposed toward the foreigner.

While in Japan I had made the acquaintance of some very charming people who reside in Shanghai, and who promised me that when I came to Shanghai they would give me a house-boat trip into the interior. At the conclusion of my investigation in North China, the opportunity came for this house-boat trip, but the gentleman who was to accompany me, Mr. Rainer, was just starting for Europe. Nevertheless, he turned his house-boat over to me, and a very comfortable boat it was, and stocked it with all sorts of provisions, and employed for me a crew of seven Chinamen, including a "Laodah" or captain who spoke a little English, the balance of the crew being coolies who spoke no English at all. In company with Mrs. Marlatt, I started out late one night from the city of Shanghai, my little house-boat being attached to a row of seven or eight Chinese boats, like a train of cars, all towed by a little steam tug. We were thus taken up the river and into the interior canal system.

It may be said that much of Eastern China is a flat country, raised above the level of the sea only a few feet, and all this area is broken up by innumerable canals, which take the place of roads. The Grand Canal of China runs from Hangchow for hundreds of miles northward, crossing the great Yang-tse and Yellow rivers, until it finally reaches Peking. It is an enormous canal, running, so far as I know, its entire length without locks, on a uniform level. We cannot imagine such a condition anywhere else in the world except in China ; nowhere else could a canal be run for such a length and across the great rivers on the water level as this and others do in China.

The morning after our start found us in this network of canals, abandoned by our campanion boats and little steam tug, and making the slow progress possible with a single stern oar. We passed many Chinese towns and villages, and finally struck the Grand Canal, which we followed

for a considerable distance, to leave it again for a long country detour, which finally brought us to the town of Haining. This is just below and in sight of the great town of Hangchow, situated at the southern terminus of the Grand Canal. Some of the branch or interior canals are large and important, or perhaps streams widened and straightened; others are narrow, and some of them mere ditches, scarcely large enough for the boat to go through, and with numerous stone bridges which offered serious obstacles to our progress.

You can easily imagine that a trip of this sort was very interesting. It afforded wonderfully good opportunities to gain an acquaintance with the whole interior flat country of this portion of China. It was possible any time to leave the boat and get out and walk along the side of the canal. As stated, the boat was propelled, after the first night, merely by the single oar at the stern, "eulowing" it is called, and the speed was about that of a slow walk, so there was plenty of opportunity to take runs across country, see the nature of the vegetation and the system of cultivation, to study the orchards and house yards, and to make collections, and this I was doing all the time at great risk of being bitten by Chinese dogs, which share their owners' antipathy to the "foreign white devil."

The portion of China explored in this way is about the equivalent in latitude with northern Florida and southern Georgia, and is the northern limit of the citrus region. Immediately back of Shanghai the peach is the important fruit crop; in fact, this is the great peach region of China. I examined a great many of these orchards and went into a great many house yards, always being threatened viciously by dogs, and stared at with coldness, if not savagely, by the Chinese. Very rarely did I find a Chinaman who was at all pleasant in his demeanor, quite the opposite in this respect of the conditions in Japan. Collections of scale insects were made through this region, but they were very rare. The whole region is excessively moist and hot in summer, resulting in very general fungous attack, so that, with the exception of one or two species, wherever I found any scale insects they were simply the remains of small colonies killed by fungus. There was scarcely a living scale insect to be found at this season of the year—late October.

The citrus fruits, which began to appear at Haining, were examined for scale insects, and here and at some near-by towns and villages a few citrus scale insects were collected. A few species also were found on the mulberry. The country traversed is a great silk, cotton and rice produc-

ing region. Cotton is more abundantly grown immediately west of the city of Shanghai, and rice in the back country. The tea districts are still further westward in the hill country. Another great tea region lies back of Hong Kong.

The scale insects found on the citrus trees were mostly common species, now cosmopolitan, such as the *Parlatoria ziziphi* and *Pergandei*, and the two Mytilaspis species, *M. Gloveri* and *M. citricola*. All of these were very rare, usually but one or two examples being found.

In regard to the climate of the region described, it may be said to be characterized by excessive moisture from the early spring to past midsummer, accompanied with very high temperature during July and August, 100° F. for several days not being uncommon. In autumn the prevailing conditions are bright days and dry weather, and the winter temperature may fall to 12° F. or lower. Scale insects, as noted, are killed out, with the exception of a few species, by this excessive moisture and high temperature.

The region to the north, extending to the mountains above Peking and connecting with the great Gobi desert, is much drier, the rains all coming in the spring and early summer, and a long period of six or seven months following, from September to February or March, with no rain, every day bright, sunny and dry, except for occasional dust storms from the desert. In this northern region it is very cold in winter.

The only scale insect which seems to thrive in central China, from Shanghai westward to the Grand Canal, is one of the Ceroplastes, probably *Ceroplastes rubens*. This species of wax scale occurs all through this region, and is especially abundant on the holly, sometimes absolutely covering this plant, leaf and branch. It occurs scatteringly also on many other plants. Climatic conditions do not check this scale insect, which is kept down somewhat, however, by predaceous ladybirds, especially the *Chilocorus similis*, which was always with it in numbers and feeds on the larval scales.

Other insect damage was very little in evidence. Not being a specialist in Coleoptera, I was not fitted to make collections of injurious beetles, but in going through the mulberry groves, peach orchards, etc., there certainly was no evidence of serious insect damage. In other words, I did not see any evidence of the work of borers in mulberry or peach. In the case of the mulberry the trees were wonderfully healthy, covered with an enormous crop of the second growth of leaves. The Chinese at the time of my trip

—in October—were busily stripping the trees of these leaves, and carrying them away in great baskets, to be used as winter forage—all of the second crop of leaves being made use of in that way.

Wherever I went there was ample evidence of the importance of the silk industry. In the little hamlets and farmhouses that I entered I frequently found the fittings for silkworm rearing. At this season the old baskets—great, flat, narrow-rimmed ones—in which the silkworms are fed in May and June, were being used to dry the late crop of cotton bolls. One frequently saw rows of these baskets in the house yards overspread with a small lot of bolls exposed to the sun to hasten their opening.

The mulberry is grown in little orchards or narrow groves lining the banks of the canals and irrigating ditches. The trees have the appearance of osier-willow stumps from the habit of the natives of cutting off all the shoots close to the stump during the feeding season, in May and June. These shoots are either stripped at once of their leaves, or are made up into bundles and taken home to be stripped afterwards. A traveller going through this same region in midsummer has noted that all the mulberries have a wintry appearance, or resemble a collection of dead stumps, but the rains which fall copiously during June and July, and the natural fertility of the soil, which is increased by cultivation and fertilizing immediately after the branches are removed, soon bring out a succulent new growth, developing a second and enormous crop of leaves, the same, in fact, which were being gathered at the season of the year of my visit. The traveller referred to above, Mr. Fortune, says that the worms are fed in the numerous little farm cottages, commonly in dark rooms fitted up with shelves placed one above another from the ground to the roof of the house. The worms are kept in the big bamboo sieves or baskets already described, evidently exactly after the manner which I had observed in Japan. The silk products of this district are considered among the finest of China, and the output must be very considerable. Those interested in the culture of the silkworm from the native Chinese standpoint, should see the little translation made by a missionary of an old Chinese work on the subject, which recently came into the possession of the Department of Agriculture.

The country penetrated is practically without forest areas. The main cultures, as stated, are rice and cotton, with the mulberry growing in little orchard strips along the banks of the canals. Usually at each farmhouse there would be a few trees—peach, plum, etc. The common shade trees are the weeping willow, occurring scatteringly along the canals, a species

of elm, and the maiden-hair tree, with occasional small clumps of bamboo, usually as yard plants, or in the cemeteries of the rich, where also may occur a few pines and the *Cryptomeria japonica*. There is little, therefore, to give a forest clothing to the country, but if one climbs any of the many-storied pagodas which occurred from time to time and takes a look over the country, the abundance of the mulberry as seen in profile and the few trees noted about the hamlets and cemeteries makes the country look fairly well forested.

This region, as stated at the outset, had not been reached by the Boxer movement, and we felt perfectly safe in going about alone and with no knowledge of the language. We took all our provisions with us, and were not dependent on the Chinese for anything, except some birds or game which our "Laodah" got for us.

This trip through the interior offered opportunities to study other forms of insects, especially mosquitoes. I collected at Haining some very interesting mosquitoes, including a rare species of Anopheles *(A. Sinensis vanus)*, as determined by Mr. Coquillett. The nights were spent on the canal in the boat, and we were bitten a good many times by these Anopheles. They were very difficult fellows to catch; in other words, the boat was open, and they would fly out before morning, but I managed to get a number of specimens. Mosquitoes, however, instead of being abundant, as one would have supposed in an open country devoted to rice culture and under water much of the year, and intersected with canals, which are permanent waterways, were very little in evidence, and, in point of fact, except at Haining, we were not troubled by them at all.

MANN: Did you find anybody who knew anything about entomology?

MARLATT: There is in Shanghai a Mr. A. Arthur, an Englishman, formerly connected with the Kew Gardens, and now in charge of the Botanical Garden, and of all the street reservations and cemeteries, etc., belonging to the European portion of Shanghai. He knew a little as a gardener would about insects.

MANN: No native entomologists?

MARLATT: No native entomologists. A missionary, Dr. Barchet, who acts as interpreter for the American Legation, and lives near Shanghai, is an amateur botanist of some note, and has collected and studied the plants of this region for twenty-five years in connection with a German botanist, Dr. Faber, who is to be credited with much of our knowledge of

Chinese botany. A good many of the plants in the Kew Gardens were obtained through these two men, especially Dr. Faber. Some years since, Dr. Faber, who was also a missionary, went into the interior of China and took his plants with him, and died there, and his collection is supposed to have been lost. Dr. Barchet has a duplicate, in part, of the Faber collection, and I went through it, especially the Rosaceæ, and examined the wild cherry, apple, pear, Cratægus, etc., which had been collected in the hill country further inland than I had reached, with the hope of finding some insects on the herbarium specimens, and also to get some knowledge of these wild fruits. But of entomological workers there are none in Shanghai.

Foreign collectors have done a great deal of work in China, notably a wealthy Englishman, the late Dr. John Henry Leech, who spent several years collecting Lepidoptera in China, and was for a time the owner of "The Entomologist." Much of the results is included in his "Butterflies from China, Japan, and Corea," a sumptuous 3-vol. work. I met, oddly enough, in going from Shanghai southward, a brother of Mr. Leech, who, however, has no special interest in entomology, but is an attaché of the British Legation in Rome, and was taking a vacation trip around the world.

While there has been a good deal of insect collecting in China, the greater portion of the country is absolutely unexplored entomologically. Very few foreigners have ever gone through the interior provinces, and in some of these the inhabitants are savage and unfriendly. In the vicinity of all the trading towns there has been some collecting, but the interior region is practically unexplored by scientists—that is, by collectors of plants or insects. Plants have been studied, and especially the horticultural sorts, more than insects, and explorers were sent out by the Horticultural Society of England early in the last century to secure new and rare plants for the English Gardens, and especially the Kew Gardens. A Mr. Fortune, already mentioned, was sent out in this way, and spent three years in China, between 1842 and 1845, and sent home shiploads of plants, including plums, peaches, mulberries, etc. His explorations were very limited, although reading them they seemed to cover a good deal of ground; but when one comes to examine his itinerary, Fortune in his three years saw but little more of the country than I did, although, of course, much more minutely. His longest trip into the interior was practically a duplicate of the one I have just described, and he made a few explorations along the coast region as far north as Peking.

I have limited my story to the house-boat trip, and cannot take time to describe the horticultural and agricultural conditions of North China, which, in fact, I have briefly discussed elsewhere.

QUAINTANCE: I should like to ask Mr. Marlatt if anything is being done in entomology in China at all; if there are any Chinese entomologists or collectors in China that he knows of. What is the status of the science in China?

MARLATT: I know very little about that matter from the Chinese side. It is very difficult to get at Chinese knowledge or practices except by long residence there. Undoubtedly the Chinese horticulturists do something for the control of various insect pests. As a rule, however, their interest in insects is chiefly from the standpoint of medicine, and most insects are considered useful in the control of disease, their ideas being the reverse of views now obtaining in this country, where insects are now known to often be the transmitters of disease. If the old saying be true, however, that "the hair of the dog cures the bite," the Chinese have plausible grounds for their beliefs that insects will cure disease!

The curious packages of May-beetle larvæ with fungus growing out of them, illustrations of which most of you have seen, come from this region and the provinces of the Upper Yang-tse. This fungus, *Corydyceps Chinensis*, is much esteemed as medicine, and is described and figured in Vol. IV., Insect Life, p. 217.

Whenever I was seen collecting insects by Chinamen, they immediately supposed I was getting the insects for medicine; that seemed to be the common idea among Chinese everywhere, and they immediately wanted to know what I was going to use them for, and undoubtedly I could have started the use of insects for any variety of purposes in the way of "cure-alls" if I had felt so inclined. The Chinese have a large nomenclature of insects—that is, they have names for all the common species of insects—and they have treatises relating to the culture of the silkworm, but I have never seen any treatise relating to insects other than the silkworm.

HOPKINS: Mr. President, I might say in my own exploration, not of China, but of Chinatown, San Francisco, I was very much interested in the kinds of insects they used for medicine. I noted especially a very large pupa shell of a Cicada, quite a large bottle full of them. I think they used them as an antidote for rheumatism, or something of that kind. I saw

them mixing up a dose for an individual who came into the drug store—or whatever they called the place where they had this medicine—and the druggist took down different bottles of all sorts of things, and spread out a paper on the counter and laid out a handful of one thing after another, until he had about half a gallon of all sorts of mixtures, which he bottled up, and the Chinaman put it under his arm and went off.

SCHWARZ: Gentlemen, I suppose you are all familiar with the fact that the Chinese not only use insects for medicine, but they also use them as an article of trade. I think Mr. Mann and many of us must have seen those collections of insects which the Chinese have offered for sale to the Europeans who visit Hong Kong and other ports. I have seen several of these sets, always arranged in the same manner and including the same species. The insects are pinned on old English needles and arranged in an artistic figure in a glass-covered box, opening from beneath.

QUAINTANCE: Have insects any real medicinal value?

SCHWARZ: Well, if you believe in a thing, it will help you, certainly.

SCHWARZ: Hong Kong is, of course, one of the best known points in regard to entomology, because for many years it has been an English settlement. In regard to Shanghai and the country back of it, the French missionaries have especially taken pains to collect insects as best they could.

MARLATT: You remind me of something that I had forgotten, in your remarks, Mr. President, namely, that I visited this French missionary establishment situated back of Shanghai, where for many years a certain priest, I think the Rev. Hué, has studied and collected insects. I went out especially to see him, and had forgotten the event until you reminded me of it. This considerable French mission lies several miles out of Shanghai, and with its big buildings is a very comfortable place, and possesses a large museum, in which are specimens kept as we keep them in our museums, of all sorts of birds and animals of the country, and a considerable collection of insects. The collection of insects was in a number of boxes, but in rather bad condition, and I was informed that the old priest who had been responsible for the museum and its collections was on his deathbed. I did not see him, therefore, but I did examine his collection, and it showed great industry and enthusiasm on his part, in that out-of-the-way corner of the world. His collections were, however, in such a condition that they could not survive very long.

(To be continued.)

LARVAL CHARACTERS OF PACHYGASTRIA TRIFOLII AND AGLIA TAU.

BY HARRISON G. DYAR, WASHINGTON, D. C.

I have postponed replying to Mr. Bacot's communication (Can. Ent., XXXV., 44–47) until I could examine his preparations. He has kindly sent them to me, and they seem definitely to settle the two points that remain at issue. The *Aglia tau* is in fluid, and shows a number of secondary setæ as described by Mr. Bacot. These setæ are short and unusually weak, so that in my own specimen, which is dried, inflated, they had become partly shrivelled, partly broken in transit. I do not think, after examining Mr. Bacot's specimen, that they can be regarded otherwise than as true setæ, and I am very willing to acknowledge myself corrected. This correction, if applied to my synoptic table of Saturnian genera (Tutt, Brit. Lep., III., 272), makes my divisions stronger and sharper than before, allying *Aglia* more strongly than ever with *Attacus* and *Saturnia*.

The *Pachygastria trifolii*, in stage I., was new to me, but it shows the normal structure exactly as I had anticipated. Tubercle v, which Mr. Bacot professes himself unable to find any trace of, "single haired or otherwise," is present in the normal position below and before iv (see figure 1). It is small and single haired, but I see it distinctly on several segments of the best-preserved larva (in balsam on a slide). The general wart pattern corresponds with *Malacosoma*, but the warts are more nearly equal, ii, iii and iv not being reduced; vi is double, the halves well separated and distinct, while the secondary warts at the anterior margins of the segments are well developed. I do not anticipate that any Lachneid will be found with tubercles iv and v united. That condition is uncharacteristic for the Bombycid phylum, though it obtains commonly in the Tineid lines. On this ground I would criticise Mr. Bacot's citation of *Anthrocera* and *Marasmarcha* (Can. Ent., XXXV., 45), which are

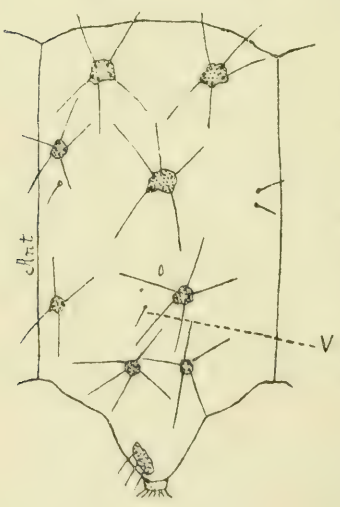

Fig. 1.

Tineid genera, as analogies for the probable structure of *Pachygastra*, a Bombycid genus, although the matter is not of importance, since the actual structure of *Pachygastra* has no need of interpretation by analogy.

NOTES ON COLEOPTERA.

BY CHARLES STEVENSON, MONTREAL.

Two good captures in the order Coleoptera were made by the young collectors of Montreal last season. One was a single specimen of the ground beetle, *Calosoma Willcoxi*, Lec., by A. Denny, on the 26th of July, when collecting under stones and leaves on the northern slopes of Mount Royal. The other was a lamellicorn beetle, *Odontæus obesus*, Lec., three specimens of which were found in a large bottle full of insects caught by my son, Kenneth R. Stevenson, at the nearest light to his home, on the evening of the 30th of August.

Through the kindness of Mr. B. Tomlin, B. A., F. E. S., Chester, England, I am in possession of four specimens of *Cassida viridis*, Linn., caught by him near Cardiff, Glamorganshire, and I can find no difference between them and specimens of the Tortoise beetle caught at Levis, Que., last season and identified by Rev. Dr. T. W. Fyles as such.

ENTOMOLOGICAL BRANCH OF THE OTTAWA FIELD NATURALISTS' CLUB.

The members of this section of the Club are endeavoring to create a more active interest in the study of entomology by holding fortnightly meetings, at the residences of the members, for the exhibition of specimens, discussion thereon, and the presentation of brief papers. The movement has so far proved most satisfactory, and the benefit of it has been felt by every individual, in reviving and quickening their love for the subject, and in affording opportunity for solving of problems which every collector meets with in examining insects which he has not specially studied. Three meetings have already been held: the first at the residence of Dr. Fletcher, who was the principal mover in organizing the meetings; the second at Mr. Harrington's, and the third at Mr. Hulkett's. They were all most enjoyable and instructive, and the two hours allotted to each were fully occupied, and the discussions and exhibits will undoubtedly bear fruit in improved work in future by the members. They also look forward to more systematic collecting in the approaching season, and to the holding of more frequent sub-excursions.

W. H. H. (Secretary).

LEPIDOSAPHES versus MYTILASPIS.

BY MRS. C. H. FERNALD, AMHERST, MASS.

The genus *Lepidosaphes* was established by Dr. Shimer, in the Transactions of the American Entomological Society, Vol. I., p. 372, Jan., 1868, with one species (*conchiformis* = *ulmi*, Linn., 1758). Although the generic description is not all that could be desired, it is certainly more satisfactory than the descriptions of many genera of insects in this and other orders which have been accepted without question.

The generic name *Mytilaspis* was first published, without a word of description, by Signoret, in his Catalogue of the Coccidæ in the Annales de la Societe Entomologique de France (4), Vol. VIII., p. 841 (1868). This paper was presented to the Society at the Seance of March 25th, but was not published till later in the year. A description of this genus was given by Signoret in the above-named work for 1870, page 91. This article was presented to the Society at the same time as the catalogue.

The genus *Mytilaspis* was evidently first proposed by Targioni-Tozzetti, in his Coccidarum Catalogus, which was published in the Atti della Societa Italiana di Scienze Naturali, Vol. XI., the title page of which bears the date of 1868, but the volume was published in four parts, and the paper covers of these parts bear the following dates: Part I., June, 1868; Part II., October, 1868; Part III., February, 1869; Part IV., April, 1869. Targioni's Introduzione alla seconda Memoria per gli studj sulle Cocciniglie and his Coccidarum Catalogus were both published in the third part of this work, and these papers should therefore date from 1869 rather than from 1868, the date usually given them.

In his Cocciniglie degli Agrumi in Italia, p. 22 (1891), Targioni gives the characters of *Mytilaspis*, and refers to his Studi sulle Cocciniglie (1867) and also to the above-named works. The name *Mytilaspis*, however, does not occur in his Studi, and therefore was not published by Targioni earlier than February, 1869.

Signoret speaks of having received Targioni's Catalogue in Ann. Soc. Ent. Fr. (4), Vol. IX., p. 113 (1869), but as it was not published at that time, we must conclude that he received a manuscript copy.

Under the circumstances it seems proper to use the generic name *Lepidosaphes* as Kirkaldy has done in his late paper on the Coccidæ in Fauna Hawaiiensis, although, of course, we are sorry to give up the familiar name *Mytilaspis*.

NEW HISTORIES IN PAPAIPEMA (HYDRŒCIA).

BY HENRY BIRD, RYE, N. Y.

(Continued from Vol. XXXIV., p. 118.)

There are certain species here and there among our moths which are possessed of a sort of will-o'-the-wisp evasiveness, and one would as soon think of encountering them in nature as of finding the mythical pot of gold at the rainbow's end. The causes that bring about such conditions are, of course, varied, and these species often stand represented by some unique type in a distant collection. That the British Museum has long taken first rank in sheltering many of these uniques goes without saying, hence the matter of a rediscovery becomes of more than ordinary moment. Further, an additional satisfaction arises, if at a second meeting with the recluse the early history is exposed as well, and we find the way open to a more extended acquaintance, the while getting an insight into the specific standing, had that ever been questioned. So, in the rediscovery of that captivating Noctuid, *Papaipema (Hydrœcia) appassionata*, one of our most elusive moths has again come to light, and we have the added pleasure of perusing an interesting larval history. The species was described by Harvey years ago, coming from London, Ontario, and his single type in the British Museum has stood perhaps as the only positive representative. That it should come to light again at so distant a point, seems a little surprising, though other of its congeners are equally dispersed, and the insight into its life habit aids in the explanation. The food-plant, *Sarracenia*, though widely distributed, is native to such districts, and flourishes under such wild conditions that these moths, whose career runs through but a few days' duration, would be scarcely met with, and we may easily conceive of the rarity of the imago.

That the larva should have been encountered, stood more in the line of probabilities, since the quaint little pitcher plant has ever been a subject of interest to naturalists, and of late years especially has been receiving the attention of many entomologists. Already the plant has furnished details among Noctuid life-histories, those pleasing little *Exyria* larvæ having had their habits chronicled by Thaxter and Riley, while the current enthusiasm concerning mosquitoes and their developments has brought out the fact of a species whose young seem to be propagated in the waters of the pitchers exclusively. With such an amount of expert scrutiny directed to *Sarracenia*, we might have expected *appassionata* to have been met before, and this very fact augurs to the restricted and localized range that colonies of the species inhabit.

To Mr. Louis H. Joutel, the artist-naturalist, we are indebted for the important disclosure, some unknown *Papaipema* larvæ found by him in the pine barrens of New Jersey ultimately proving this very desirable species. The discovery happened at an early stage, and when later it became assured that we were dealing with an unknown larva, a subsequent visit to the locality extended our acquaintance to a small but thriving colony.

A first visit to the pine barrens is fraught with many surprises, the extremely distinct flora and fauna of such a district being a never-failing source of enjoyment. One looks in vain for the usual thick-stemmed weeds in which our boring friends are wont to occur, but the soil conditions debar such a growth; in fact, one looking for them alone would soon give up in despair. The herbaceous plant life runs to all sorts of odd creations, with orchids and sundews and a host of bright flowering plants in a variety of forms that bring joy to the heart of the botanist. Strange noises are in the air, as large, unfamiliar Hymenoptera buzz past. Even the Cicada's note sounds queer, and the long-drawn, monotonous bur-r-r-r proves to be produced by an unfamiliar form. Only the mosquitoes, the untold hosts of mosquitoes, are thoroughly familiar, and even here very likely many distinctive species exist, though the ordinary mortal is more intent on the virtues of some repellant, rather than on the variety of species that may be feasting upon the exposed portions of his anatomy. So it is not strange, after all, that such a locality should produce some unlooked-for novelty.

When coming to hand the young larvæ were apparently past second moult, the first pair of abdominal legs being still aborted, so that a slightly-looping position occurs when moving. It still on occasion would spin a silken thread when sliding from an insecure footing or upon a sufficient apprehension of a fall. Appearance is very similar to *purpurifascia*, and there exists a way of working that strongly recalls this species. There appeared only one difference: with *purpurifascia* the dorsal line is continuous, with our friend of the pitchers it is suppressed on joints four to eight. In the succeeding stage developments bespeak a greater individuality. We have the typical *Papaipema* larva, of exceedingly cylindrical build, the longitudinal stripes queerly broken at its middle. The colour is a good shade of sienna, somewhat livid, the dorsal and subdorsal lines pure white. The tubercles, thoracic and anal plates are all very pronounced and follow the usual positions. On joint ten

there is no development of the plate IVa, at the upper corner of the spiracle, as occurs with some other species. In the penultimate stage, conditions are similar, the salient features of comparative value being the absence of a continuous dorsal line and of IVa on joint ten. It is by these points separable from *purpurifascia*, which it so closely personifies at first glance. The large dorsal plates preceding the anal one are well divided by the dorsal line; in some other species these plates become confluent. At maturity the length is 39 mm.; head nearly 2 mm. wide. The colour does not fade to translucence entirely, but retains a distinct sienna shading. Pupation occurs about the first week in August. The chrysalis offers no distinguishing point. Being formed outside the burrow, there is not the extreme cylindrical shape caused by a narrow aperture. It is of a paler colour than usual, of slender proportions, very active, and measures 20–22 mm. The species seems rather a small one, though, given a larger food-plant, we might expect better developments. *Sarracenia* is an odd plant to have been selected by a boring larva of the size of the species under consideration. There being scarcely any stalk, the larva must needs use the root, and here the supply is rarely enough in one plant for attaining maturity. Workings do not extend to the pitchers in any way, for though one young larva was observed to enter the plant by the pitcher's tube, it is not likely this is the usual channel, since they so often contain more or less water. The little *Exyria* larvæ can easily mount the pitcher's side and keep above any water as occasion requires. Indeed, it seems surprising that some insects are immune to these dangers, where so many others have fallen. The remains of quantities of entrapped insects are to be found in the pitcher's neck, being consumed by the acids there secreted. Here is sure to flourish the slug-like maggot of the *Sarcophaga* fly. A little further up an *Exyria* may have its abode. Down in the root *appassionata* may be seeking the seclusion which has stood it in such good stead for so long. An anomaly is surely presented: this insectivorous plant now harmless and furnishing food for those insects that have grown wise in their own and succeeding generations.

Though not having personally viewed Harvey's type, the determination of the *Sarracenia* species is due in a measure to courtesies extended. While the application of the description may be entirely satisfactory, and the aid of coloured drawings has appeared to settle any reasonable doubts, we must still bear in mind that species run very close in this genus at times, and a single example, as in the case of this particular type, does not

always convey all that the species really personifies. The pattern of *Papaipema* in a rather extended group of species is often so similar that a verbal differentiation is sometimes difficult, yet *appassionata* stands by itself in some details. The solid red terminal space, the bright yellow lower median field, and the large white spots in an apparently restricted median space, both in type and would-be duplicate, are a combination of features not occurring elsewhere in the same contrast, and offer a rather striking individuality when seen in the originals. Then, too, there is a Western form as yet awaiting a better familiarity, which it is expected will better cement the species. That larval developments upon a proper acquaintance offer such an aid in this genus is one of its satisfactory features, and with the widely-increasing interest that is at present developing, we may soon be assured of settling any doubtful questions.

THE TOMB OF THOMAS SAY.

BY F. M. WEBSTER, URBANA, ILL.

Entomologists in general, and Americans in particular, are much interested in all that pertains to one who has justly become known as the father of American entomology.

As is generally known, the tomb containing the remains of this famous naturalist is on the grounds of the old Maclure home, in the city of New Harmony, Indiana.* This has recently changed owners, and the old house in which Say died has been remodelled, the older portion having been torn down. This was made necessary by the crumbling of the walls, but the new owner, Mr. John Corbin, has only allowed this to be done where it became absolutely necessary. Fortunately, Mr. Corbin fully appreciates and reveres the historic old structure, and, as he stated recently to me, "has desecrated it just as little as possible."

In reply to my question as to his intentions relative to the tomb, Mr. Corbin assured me that so long as he lived and possessed the premises it should remain untouched, and the tone in which he spoke left no doubt as to his sincerity. The ground is in the centre of the city, and hence valuable, but Mr. Corbin will keep his word, as I am fully convinced, and it will be long years before any change is likely to occur that will affect the last resting place of the dead naturalist.

*See Entomological News, Vol. VI., Nos. 1–4, 1895.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

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(Paper No. 13.—Continued from Vol. XXXV., p. 44.)

Family XL.—Thynnidæ.

This family, although quite distinct, is closely allied to the two which follow—the *Myrmosidæ* and the *Mutillidæ*—and it will probably be difficult for the student to separate at once the wingless females from some in the families mentioned. Some authorities, having been unable to find good characters to separate these wasps, have classified all together as a single large family under the name *Mutillidæ*; but I think incorrectly so.

The middle coxæ are not contiguous, as in the *Mutillidæ* and *Myrmosidæ*, being separated, usually, by a triangular or bilobed projection of the mesosternum, while the thorax in the females is also quite distinct, being divided into *three* parts; in the *Myrmosidæ* the thorax is divided into *two* parts only, while in the *Mutillidæ* it is *undivided*, the pro-, meso- and meta-thorax being closely united, *without* distinct dividing sutures.

The males in the three families, to a certain extent, closely resemble one another, and are not so easily separated, although each family has a distinct *habitus* peculiarly its own, which one easily recognizes with practice, the shape of the head, the thorax and the abdomen being slightly different; the genitalia armature, however, with but few exceptions, is quite different in the three families.

Many genera have been proposed for these wasps, the majority of which I consider good, although Dr. von Dalla Torre, in his Catalogus Hymenopterorum, has placed most of them under the genus *Thynnus*, Fabr., causing much confusion. This arrangement throws a great many with the same specific name together, and for these he has proposed new specific names, which still further complicates matters, burdens our literature with names that will not hold, but which must be quoted, and making it exceedingly difficult to keep track of.

I find the date of Guérin's Paper on this group, published in Duprerry's Voyage de la Coquille, is given as 1830, whereas, although the title page is so dated, it did not appear until 1839; it also makes certain changes in synonymy necessary.

The family is very large and widely distributed, but is more extensively represented in South America, in Australia and Africa than elsewhere, Europe and North America having only a few representatives.

The study of the genera and species is most difficult on account of the great dissimilarity of the sexes, the slowness with which material comes in, and the absence of good collectors to take the sexes *in coitu*, so that the sexes can be correctly correlated and the genera more thoroughly elaborated.

I have divided the family into three subfamilies, which may be recognized by the characters employed in the following table:

Table of Subfamilies.

Females ..... 1.

Males ..... 4.

1. Body rather short, not elongate: thorax above convex, the metathorax very short, obliquely truncate posteriorly, transversely compressed or sublamellar, more rarely long ..... 3.

Body elongate and slender; thorax above more or less flattened, rarely convex.

Metathorax never very short, nor transversely compressed; abdomen smooth, the second dorsal segment *without* transverse folds or carinæ, the pygidium and hypopygium normal ..... 2.

Metathorax very short, obliquely truncate posteriorly, from the base or very near the base, transversely compressed or sublamellar; abdomen not smooth, variously sculptured, the second dorsal segment more or less punctured, or rugulose, and usually *with* two or more transverse folds or carinæ, sometimes many; pygidium and hypopygium abnormal, variously modified ..... Subfamily I., Thynninæ.

2. Head transverse, much wider than long, the eyes large, the ocelli distinct ..... Subfamily II., Methocinæ.

Head large, oblong, quadrate or nearly, more rarely subrotund or obtrapezoidal, the eyes not large, the ocelli usually wanting ..... Subfamily III., Rhagigasterinæ.

3. Metathorax short, usually obliquely truncate from its base; abdomen not wholly smooth, the second dorsal segment punctate or rugulose, and usually *with* two or more transverse folds or carinæ, the pygidium and hypopygium abnormal, variously modified, the latter usually

dilated into a broad margin at apex, or trumpet-shaped, the former often striate or coarsely sculptured .....Subfamily I., Thynninæ.

Metathorax not very short; abdomen smooth, the second dorsal segment *without* transverse folds or carinæ, the pygidium and hypopygium normal, not modified in any way .....Subfamily III., Rhagigasterinæ.

4. Hypopygium *armed* with one or more spines or teeth or trilobed...5.
Hypopygium *unarmed*, at apex truncate or rounded.....9.
5. Thorax elongate; front wings *with* radial and cubital cells... ....6.
Thorax rounded; front wings *without* radial and cubital cells.....9.
6. First transverse cubitus distinct, *with* an appendage.....7.
First transverse cubitus wanting, or if present, *without* an appendage..8.
7. Mandibles bidentate .....Subfamily I., Thynninæ.
Mandibles tridentate .....Subfamily III., Rhagigasterinæ.
8. Hypopygium produced at apex into a long aculeus which curves upwards.....Subfamily II., Methocinæ.
Hypopygium armed with a long aculeus which curves upwards, but that originates *before* the apex.....Subfamily III., Rhagigasterinæ.
9. Mandibles bidendate.....Subfamily I., Thynninæ.
Mandibles tridentate .....Subfamily III., Rhagigasterinæ.

Subfamily I.—Thynninæ.

The males in this group show a wonderful difference in the structure of the mouth-parts and in their genitalia, which, in time, will enable the group to be divided into four or more tribes, namely, *Thynnini*, *Myrmecodini*, *Scotaenini*, *Amblysomini*, etc.; but this had better not be done until more of the forms, in both sexes, are known.

Table of Genera.

Males.....1.
Females.....29.

1. Hypopygium *armed*, ending in a single triangular tooth or spine, or tridentate or trilobed; sometimes 5-dentate, a small tooth on each side at base in addition to the apical teeth; sometimes oblong, narrowed, tridentate, or trilobed at apex.....2.
Hypopygium *unarmed*, truncate or rounded at apex.....20.
2. Hypopygium at least tridentate or trilobed, sometimes 5-dentate...3.
Hypopygium ending in a large triangular tooth or single spine, rarely with indications of a lobe at the basal angles of same, the lateral margins sometimes arcuate or rounded .....10.

3. Hypopygium 3-dentate, or trilobed ..... 6.
Hypopygium 5-dentate, or with 5 spines.
Clypeus produced and anteriorly truncate or subarcuate, *with* a short, stout tooth or elevation at the basal lateral angles, near the base of the eyes ..... 4.
Clypeus anteriorly not much produced, rounded, *without* a tooth at the basal lateral angles ..... 5.

4. Abdomen fusiform or ovate, not longer than the head and thorax united, the segments constricted at the sutures; segments 2–3, or more, with yellow or yellowish-white spots; first ventral segment with a triangular tooth or elevation near the middle. the sixth *with* a tooth at the apical angle; maxillary palpi 6-jointed; labial palpi 4-jointed. (Australia) ..... Thynnus, Fabricius.
(Type T. dentatus, Fabr.)
Abdomen longer than the head and thorax united, the sides nearly parallel, the segments more or less constricted at the sutures, black, immaculate, the first and sixth ventral segments normal, unarmed; maxillary palpi 6-jointed, the joints short; labial palpi 4-jointed. (Australia.) ..... Thynnidea, Ashm., gen. nov.
(Type Thynnus fumipennis, Westw.)

5. Metathorax with a median tooth at apex; abdomen longer than the head and thorax united, cylindrical, the sides parallel, the segments constricted at apex, immaculate; maxillary and labial palpi both 4-jointed. (Australia) ..... Iswaroides, Ashmead.
(Type I. Koebelei, Ashm.)

6. Marginal cell at apex pointed or slightly rounded, but *never* truncate; second cubital cell not triangular ..... 7.
Marginal cell at apex truncate; second cubital cell triangular.
Clypeus with a median emargination anteriorly; maxillary and labial palpi both 3-jointed. (India) ..... Iswara, Westwood.
(Type I. luteus, Westw.)

7. Hypopygium not narrow, in outline triangular, 3-dentate, the middle tooth large, triangular, projecting far beyond the lateral teeth, which are usually small ..... 8.
Hypopygium quite differently shaped, narrower and oblong, as wide or nearly at apex as at base, the sides parallel or nearly, the apex usually briefly tridentate or trilobed, the teeth or lobes equal or nearly, the middle tooth very rarely much longer than the lateral teeth ..... 16.

8. Clypeus produced anteriorly and entirely covering the labrum, or the latter only slightly visible ..... 9.

Clypeus not so produced, the disk thickened, convex, the labrum usually large and distinctly visible, rarely partly concealed.

Head with a prominence above the insertion of the antennæ and connected with the clypeus by a carina ; antennæ of moderate length ; fifth ventral segment *with* a tooth at each apical angle; pygidium subtriangular, broader at base than long, and longitudinally striated ; maxillary palpi 6-jointed ; labial palpi 4-jointed. (Australia)..... Zaspilothynnus, Ashm., gen. nov.
(Type Thynnus Leachiellus, Westw.)

Head anteriorly with two prominences, beneath which are inserted the antennæ; antennæ very long; fifth ventral segment *without* a tooth at the apical angles.
(Australia) ..... Tachynomyia, Guérin.
(Type Agriomyia spinolæ, Guér.)

9. Clypeus trapezoidal, truncate anteriorly.

Maxillary palpi 6-jointed, the middle joints the longest ; labial palpi 4-jointed, the first joint the shortest, *without* a tuft of hairs at apex, joints 2–4 longer, nearly equal in length. (Australia) ..... Thynnoides, Guérin.
(Type T. fulvipes, Guér.)

Maxillary palpi 6-jointed, the three last joints very long, much longer and slenderer than the basal joints ; labial palpi 4-jointed, the first very long, nearly as long as joints 2–4 united, *with* a tuft of very long hairs at apex. (Australia)..... Pseudaelurus, Ashm., gen. nov.
(Type Aelurus abdominalis, Guérin.)

10. Clypeus anteriorly truncate or very slightly arcuate, never emarginate; pygidium neither carinate at sides nor truncate at apex..... 11.

Clypeus anteriorly broadly, shallowly semicircularly emarginate, concave or excised ; pygidium squarely truncate at apex and usually carinate at sides, the apical lateral angles acute..... 15.

11. Pygidium at apex rounded, *without* a median incision or emargination ..... 12.

Pygidium at apex rounded, but *with* a median incision or emargination.

Abdomen fusiform, maculate; hypopygium with the sides strongly rounded or arcuate, and ending in a rather long spine, which is

more than three times as long as thick at base; maxillary palpi 6-jointed; labial palpi 4-jointed.
(Australia) ..... Catocheilus, Guérin.
(Type C. Klugii, Guér.)

12. Clypeus produced anteriorly, trapezoidal, the front margin squarely truncate and overlapping the mandibles, the labrum invisible; abdomen not smooth, more or less punctate ..... 13.

Clypeus very similar but not so much produced anteriorly, the mandibles wholly exposed, the labrum more or less visible; abdomen smooth, shining, or at most with fine, microscopic lines.

Labrum narrowly transverse or arcuate, not bilobed; hypopygium ending in an acute spine, the lateral margins slightly arcuate, the basal angles with usually a slight lobe, but not acute enough to be considered a tooth; mandibles bidentate, the outer tooth the longer and larger; maxillary palpi 6 jointed, the three last joints much slenderer than the preceding joints, the last joint not longer than the penultimate; labial palpi 4-jointed ..... Myrmecodes, Latreille.
(Type Tiphia pedestris, Fabr.)

Labrum bilobed; hypopygium ending in a spine which curves slightly upwards, the lateral margins almost straight.

Maxillary palpi 6-jointed, the last joint longer than the penultimate; labial palpi 4-jointed.
(Australia) ..... Guérinius, Ashm., gen. nov.
(Type Thynnus flavilabris, Guér.)

13. First ventral segment *unarmed* ..... 14.

First ventral segment *armed* with a prominent median tooth.

Head more than twice as wide as thick antero-posteriorly; abdomen maculate; maxillary palpi 6-jointed ..... Agriomyia, Guérin.
(Type A. maculata, Guérin.)

14. Abdomen ovate, maculate, the hypopygium oval, ending in a short spine; maxillary palpi 6-jointed, the three last joints longer than the first three; labial palpi 4-jointed, the joints short ..... Cephalothynnus, Ashm., gen. nov.
(Type Thynnus odyneroides, Westw.)

Abdomen fusiform, longer than the head and thorax united, the hypopygium triangularly pointed, the sides only slightly arcuate;

maxillary palpi 6-jointed, the second and the last joint longer than joints 3–5; labial palpi 4-jointed, short ..... Hemithynnus, Ashm., gen. nov.
(Type Thynnus hyalinatus, Westw.)

15. Maxillary palpi 6-jointed, long, the joints, except the first, which is very short, long, subequal, the last joint the slenderest and a little the longest; labial palpi 5-jointed. (South America) ..... Elaphroptera, Guérin.
(Type Myrmecodes dimidiatus, Hal.

16. Hypopygium ending in three small, equal or nearly equal, triangular teeth, rarely with the middle tooth much longer than the lateral, or spined ..... 17.
Hypopygium ending in three small, equal, rounded lobes ..... 19.

17. Clypeus subproduced and anteriorly emarginate, excised or bidentate ..... 18.
Clypeus produced, trapezoidal, the anterior margin truncate, never emarginate or excised.
Abdomen elongate, subcylindrical, smooth, shining, spotted with yellow, much longer than the head and thorax united; first joint of flagellum only about half the length of the second; hypopygium at apex 3-spined, the middle spine the longest. (Australia) ..... Aeolothynnus, Ashm., gen. nov.
(Type A. multiguttatus, Ashm.)

18. Abdomen oblong-oval or fusiform, longer than the head and thorax united, the segments banded or maculate with white or yellow. (South America) .... Pseudelaphroptera, Ashm., gen. nov.
(Type Elaphroptera Spinolæ, Sauss.)

19. Clypeus broadly, semicircularly emarginate anteriorly, leaving a deep concave space; metathorax with two deep impressions or short furrows at apex; maxillary palpi long, 5-jointed, the first joint short; maxillary palpi 4-jointed; abdomen elongate, narrowed towards base, shining, but microscopically shagreened. (South America) ..... Pycnothynnus, Ashm., g. nov.
(Type Elaphroptera atra, Guér.

20. Third cubital cell, along the cubitus, shorter than the second or no longer ..... 21.
Third cubital cell distinctly longer than the second ..... 22.

21. Clypeus subproduced, with a slight median sinus or incision anteriorly, the labrum well developed ; maxillary palpi 5-jointed ; labial palpi 4-jointed. (Australia)..... Anthobosca, Guérin.
(Type A. Australasiæ, Guér.

22. Mandibles narrower, curved, the teeth acute ; abdomen oblong, fusiform or subcylindrical, as long or longer than the head and thorax united..... 23.

Mandibles broad, the apical tooth large, obtuse, the inner tooth with a long cutting face ; abdomen oval, hardly as long as the thorax or no longer.

Head about twice as wide as thick antero-posteriorly, not wider than the thorax; pronotum short, transverse ; mesonotum fully as wide as long, with two furrows ; metathorax short, rounded behind..... Amblysoma, Westw.
(Type A. Latreillei, Westw.)

23. First transverse cubitus *with* an appendage..... 24.
First transverse cubitus *without* an appendage.

Abdomen long, cylindrical, the first segment much longer than wide at apex, petioliform. (South America) ..... Klugianus, Ashm., gen. nov.
(Type Thynnus haematodes, Klug.)

24. Clypeus produced and anteriorly broadly truncate, trapezoidal.... 25.
Clypeus anteriorly not broadly truncate, slightly rounded, subemarginate, deeply triangularly emarginate, or bidentate..... 26.

25. Clypeus *with* a median carina ; maxillary palpi 6-jointed, slender ; labial palpi 4-jointed ; abdomen maculate or fasciate with yellow. (Australia)..... Zeleboria, Saussure.
(Type Thynnus carinatus, Smith.)

Clypeus *without* a median carina ; maxillary palpi 6-jointed, not slender ; labial palpi 4-jointed ; abdomen with white spots, the hypopygium near the tip with a pointed and a clavate appendage of hairs..... Psammothynnus, Ashm., gen. nov.
(Type Thynnus depressus, Westw.)

26. Hypopygium *not* prominently projecting, always obtuse or truncate at apex ..... 27.

Hypopygium much narrowed, narrowly rounded at apex, and prominently projecting beyond the tip of the abdomen.

Clypeus anteriorly subtriangularly emarginate or tridentate; maxillary palpi 6-jointed, the first joint short, the following joints longer, subequal; labial palpi 4-jointed, the first joint shorter than the 2nd and 3rd united; abdomen spotted. (South America) ..... Spilothynnus, Ashm., gen. nov. (Type Thynnus laetus, Klug.)

27. Clypeus anteriorly subemarginate, deeply emarginate or tridentate ..... 28.

Clypeus anteriorly rounded, not emarginate.

Abdomen fusiform, a little longer than the head and thorax united, maculate or fasciate; maxillary palpi 6-jointed, the last three joints much longer than the first three, or twice as long; labial palpi 4-jointed, joints 1 and 4 longer and slenderer than 2 and 3, which are short, stout. (South America ..... Anodontyra, Westwood.) (Type A. tricolor, Westw.)

28. Clypeus anteriorly subemarginate; maxillary palpi 6-jointed, joints 1–3 rather short, joints 4–6 long, subequal, five or six times longer than thick; labial palpi 4-jointed, the first joint long and slender, about as long as 2–4 united; abdomen fasciate. (South America.)

Clypeus anteriorly bidentate; maxillary palpi 6-jointed, the joints obconical, unequal, the first four short, the third and fourth much longer than the second. (South America) ..... Ornepetes, Guérin. (Type O. nigriceps, Guér.)

29. Pygidium not very narrow, oblong, rounded at apex, usually shagreened, punctate, rugulose or striate; if smooth, which is rare, it is curiously modified, compressed towards base and broadened into an elevation posteriorly; basal segment of abdomen *without* a strongly curved furrow on each side or a strong transverse furrow before the apex.. 30.

Pygidium very narrow, smooth and shining; basal abdominal segment *with* a strongly curved furrow on each side, or a deep, transverse furrow before apex.

Basal abdominal segment with a strongly curved furrow on each side; second segment with about three transverse folds or carinæ; pygidium with two pencils of long golden hairs that curve and meet above the narrow elevation on its disk ..... Thynnus, Fabricius.

Basal abdominal segment with a strong transverse furrow just before apex; second segment with three transverse folds or

carinæ ; pygidium long, lanceolate, broadest at apex, without the two pencils of golden hairs.....Thynnidea, Ashm.

30. Head seen from above *not* triangular, usually transverse, subquadrate or obtrapezoidal.....31.

Head seen from above triangular.

Eyes small, oval, extending to base of mandibles ; clypeus very short, truncate ; mandibles falcate, pointed at apex ; maxillary palpi 4-jointed ; labial palpi 3-jointed ; second segment of abdomen with two transverse folds or carinæ towards apex.....Iswaroides, Ashmead.

31. Pronotum *not* quadrate, obtrapezoidal, or wider in front than behind..33.

Pronotum quadrate, usually, however, a little wider than long, but not wider in front than behind.

Head not or scarcely wider than the thorax, the latter not especially narrow.....32.

Head much wider than the thorax, the latter being very narrow, with the sides parallel ; dorsal abdominal segments 1 and 2 strongly transversely furrowed ; pygidium oval or nearly and longitudinally striate.....Catocheilus, Guérin.

32. Clypeus slightly produced, truncate anteriorly, the labrum visible as a narrow transverse line, ciliate ; mandibles narrow, acute at apex ; maxilary palpi 6-jointed, not short ; labial palpi 4-jointed. (Australia).....Entelus, Westwood.
(Type E. bicolor, Westw.)

Clypeus short, broadly truncate anteriorly, but the labrum not visible ; mandibles falcate, rounded at apex; maxillary and labial palpi both 4-jointed ; first abdominal segment with a broad, finely shagreened depression at apex, the second segment with two transverse carinæ, the intermedian space between the carinæ shagreened, opaque ; pygidium narrowly compressed towards apex and then abruptly dilated or trumpet-shaped.....Spilothynnus, Ashm.

33. Head large, obtrapezoidal, subquadrate or subglobose, the temples or the space back of the eyes very broad, *without* furrows or impressions extending from the antennæ to the vertex.....34.

Head transverse, much wider than thick antero-posteriorly, the temples not especially broad, *with* sometimes two furrows or impressions extending from antennæ to vertex.....41.

34. Head subquadrate or subglobose ..... 35.
Head large, obtrapezoidal, the temples abnormally broad.
Abdomen oblong oval, the second dorsal segment with three or four transverse folds or carinæ; pygidium long oval, longitudinally striate; labrum longly ciliated; maxillary palpi minute, 2-jointed; labial palpi 4-jointed, the last joint as long as joints 1–3 united. (Australia.) ..... Cephalothynnus, Ashm.

35. Head subquadrate or subglobose, the hind angles rounded, the temples about four times the width of the eye ..... 36.
Head almost quadrate, only a little wider than long, the temples only about twice the width of the eye.
Abdomen large, oblong-oval, the second dorsal segment with about five transverse carinæ; pygidium long, ellipzoidal, very slightly narrowed at the middle and longitudinally striate; labrum hardly visible, ciliate; maxillary palpi minute, 2-jointed; labial palpi short, 3-jointed, the second joint the longest and thickest ..... (?) Thynnidea, Ashm.

36. Metathorax with the disk of the oblique truncation flat but not concave ..... 37.
Metathorax with the disk of the oblique truncation concave or subconcave.
Abdomen large, oblong-oval, the second dorsal segment coarsely rugulose, with two transverse folds or carinæ at apex; pygidium longitudinally rugulose ..... Elaphroptera, Guérin.

37. Metathorax *without* a hump-like elevation at base just behind the scutellum ..... 38.
Metathorax *with* a hump-like elevation at base just behind the scutellum.
Second abdominal segment with a transverse fold or carina near base and another near apex, the intermediate space very coarsely rugulose; pygidium oblong-oval, finely, longitudinally aciculated towards apex ..... Pycnothynnus, Ashm.

38. Metathorax obliquely truncate from the base, *without* a distinct metanotum ..... 39.
Metathorax *with* a short but distinct metanotum, trapezoidal, the truncation abrupt, perpendicular; abdomen with a depression near apex and a delicate transverse carina just before apex; the depression finely coriaceous; second segment with a depression

from the middle which is rugulose; pygidium oblong-oval, rugulose towards base; mandibles with a sinus before apex, appearing bidentate.....Anodontyra, Westwood.

39. Clypeus *without* a trace of a median carina, the anterior margin truncate .....40.

Clypeus *with* a more or less distinct median carina, the anterior margin subangularly produced.

Pygidium oblong-oval, longitudinally striate, and with a lobe or tooth on each side before the apex; first abdominal segment with traces of transverse carina or elevated lines at apex, the second segment with many transverse folds or carinæ, 17 or more; metathorax sloping from its base.....Myrmecodes, Latreille *(partim)*.

40. Pygidium oblong, with a more or less elongate, lanceolate elevation on its disk gradually broadened posteriorly, the elevation with some longitudinal lines towards base, smooth at apex; first abdominal segment with a depression at apex, the second segment with five transverse folds or carinæ, metathorax sloping from a little beyond its base, leaving a short but distinct metanotum.....Thynnoides, Guérin.

41. Pygidium very narrow, or strongly compressed towards base, with an elevation towards apex .....42.

Pygidium neither very narrow nor compressed towards base, without an elevation or disk, above flat or subconvex, striate, punctate or rugulose .....45.

42. Head about twice as wide as thick antero-posteriorly, or three times as wide as thick when viewed from above.

Second dorsal abdominal segment with three or more transverse folds or carinæ.....43.

Second dorsal segment with only *one* transverse carina just before apex, the anteriorly portion rudely punctate.....Psammothynnus, Ashm., gen. nov.

43. Second abdominal segment with *many* transverse folds or carinæ..44.

Second abdominal segment with three transverse folds or carinæ.

Pygidium elongate, smooth, the hypopygium with two converging carinæ at base.....Zelaboria, Saussure.
(Type Thynnus carinatus, Smith.)

44. Second abdominal segment with 20 or more transverse carinæ, the first segment with a transverse furrow just before apex, the third and

following segments smooth ; head with a concave depression above each antenna that extends to the vertex ; pygidium strongly compressed at the middle, and then broadened into an oval plate, the basal portion, which is separated from the oval apical portion by the strongly compressed portion, is transversely striated, while the apical portion is smooth.....Zaspilothynnus, Ashm.

Second abdominal segment with about 13 or 14 transverse carinæ, the first segment with many oblique striæ at the sides towards apex, the following segments after the second shining but microscopically shagreened, with a few scattered feeble punctures, especially noticeable on apex of the two last segments ; pygidium compressed basally, dilated apically, but with an emargination on each side at apex, smooth and *without* transverse striæ at base .....Tachynomyia, Guérin.

45. Clypeus *without* a median ridge .....46.

Clypeus *with* a median ridge.

Pygidium not very narrow, deflexed apically, longitudinally striated, and with a tooth or lobe at each side towards the base ; mandibles broad and flat, obtuse at apex, with a longitudinal grooved line along the inner margin and another along the outer margin for a little more than half their length .....Myrmecodes Latreille.
(Type Tiphia pedestris, Fabr.)

46. Head *without* convex impressions extending from the antennæ to vertex, subopaque; clypeus transversely narrowed, with a slight median tooth anteriorly ; mandibles long, falcate ; second dorsal abdominal segment with a transverse carina near base and another near apex, the intermediate space multistriated transversely; pygidium oblong-oval, longitudinaily striated with a notch on each side before apex ; maxillary palpi 3-jointed ; labial palpi 4-jointed.....Hemithynnus, Ashmead.

Head *with* two convex impressions extending from the antennæ to the apex ; clypeus transversely narrowed, with a slight median sinus anteriorly ; mandibles, falcate, acute ; pygidium strongly compressed at sides just before the apex, then dilated, and as seen from behind appearing as an oval elevation more or less transversely aciculated, rarely smooth.....Agriomyia, Guérin.

A FEW LAST WORDS TO DR. WASMANN.

BY THOS. L. CASEY, ST. LOUIS, MO.

I have read with some interest Dr. Wasmann's "Last Reply" in the March number of this journal (page 74), and hasten to say that I was by no means "angry" when I wrote the answer referred to. I was only pained to think that a man of Dr. Wasmann's eminence in the scientific world would stoop to send to a colleague a specimen without marks of any kind for identification, in order to have him commit himself to an opinion when deprived of the subtle influence of at least a locality label.

I feel sure that upon reflection Dr. Wasmann will not hold me responsible for his failure to glance over the matter referred to in my paper, which, the heading stated, comprised other studies besides the revision of Corylophidæ, etc., or for my being at a loss to understand the correspondence in the light of current events.

I did not send Dr. Wasmann a copy of my reply, because, as he had used this journal as a vehicle of publication, I supposed that he was accustomed to reading it regularly. Not a single copy of my "extras" has been sent out to anyone, it seeming preferable to me that the article in question should be known only within the sphere of circulation of the journal in which his original article and my reply appeared. Dr. Wasmann has evidently misinterpreted the motive of my failure to send him a copy, and I therefore make this explanation.

If I went too far in misconstruing Dr. Wasmann's actions in this matter, which is not very momentous from any point of view, it will give me pleasure to retract whatever may have wronged him. Our entomological friends have the full history of the issue, and can form their own conclusion.

A PRESENT TO THE SOCIETY.

The Entomological Society of Ontario has been kindly remembered by Messrs. J. and H. Comstock, Evanston, Ill., in a contribution to its collection of a number of butterflies taken by themselves in a trip through Colorado during the season of 1902. Carefully done up in papers, named and dated, with the localities in which they were taken, these specimens are of special interest as representing much-discussed forms of that famous locality, which hitherto have been known to us only by name.

J. Alston Moffat, Curator.

NOTE ON *DEILEPHILA GALII*, ROTT.

Mr. Percy B. Gregson, of Blackfalds, Alta., sends a painting, made by Mr. F. C. Clare, of Edmonton, of the larva of *Deilephila galii*, Rottemburg. Mr. Gregson writes that these large larvæ are a luscious treat for prairie chickens in early autumn, and are quite often found entire, although, of course, dead, in their crops. These larvæ in the Northwest feed on the Giant Willowherb [*Chamænerion angustifolium* (L.), Scop.], and it was from this food-plant that its more generally-known name of *Chamænerii* was derived. I have read that these larvæ are also eaten regularly by some tribes of Indians in California. Some years ago I examined the contents of the crops of four prairie chickens from Western Manitoba, and found them stuffed with the hips of the prairie rose, the leaves of the alkali-loving Ranunculus [*Oxygraphis cymbalaria* (Pursh) Prantl.], and many specimens of *Chrysomela lunata*, Fab. The specific name of the insect under discussion is, I presume, merely the genitive case of *Galium*, the botanical name of the Bedstraw, one of the food-plants of the larva. If this is the case, the usual spelling with the letter *l* doubled is a mistake, notwithstanding that it appears so spelled in most lists. Although properly spelled in the index of Dr. Dyar's new list, it is in the inaccurate form in the body of the work. I merely mention the matter, because I find that the mistake, if it is one, occurs both in European and American lists.—J. FLETCHER.

NOTE ON NORTH AMERICAN ATTACI.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

I repeat here, for the benefit of American readers, the descriptions of two abberations, given by me originally in the pages of the *Insekten* Börse, 1902.

Samia Californica, ab. *parvimacula*.—The male specimen is of a lighter red than usual, and the lunate discal spots are so reduced on all four wings as to appear half the usual size. They are, in fact, narrow, and only about 5 mm. in length, squarish in form. The antennæ are greatly reduced, the usual length being about 20 mm., while here they are only about 14 to 15 mm., and the pectinations appear to be proportionately reduced. The expanse is normal, about 95 mm., but at first sight the specimen suggests a different species.

I may mention here a female, *S. Californica*, which has the right secondary smaller and of a peculiar translucent appearance, suggesting an

instance of retarded development. It has been elsewhere shown, in a similar case, that the undeveloped wings present resemblances to the pupal condition.

Telea polyphemus, ab. *flava*.—The colour of the female specimen is of a rather bright ochrey yellow. The darker inner shading to the subterminal band on primaries is wanting and this outer band itself is white. The eye-spots are as usual and thus quite different from the Western form *oculea*, Neum. In colour, *Telea* varies from roseate to olive ochre. I have seen a second specimen of this yellow aberration in a private collection.

In the proceedings of the Am. Phil. Soc., Vol. xli., No. 171, I have illustrated an instance of the spinning of a silken attachment around the stem of the enveloping leaf in the cocoon of *Telea*, reminding us of the habit of *Philosamia cynthia*, or, even perhaps of *Antheræa mylitta*. I have since found three more examples of this hitherto unnoticed habit, among a lot of cocoons of *Telea*, but the false stem in these instances does not seem to have been fastened to the branch. It is difficult, however, from collected material to be quite certain of the fact, and it would be interesting if American collectors would observe closely the spinning methods of *Telea*. The silken attachment looks like that of *Callosamia promethea*, but entirely encloses the stem of the leaf.

ERRATA.

March No., page 75, for ARATUS read ARADUS.

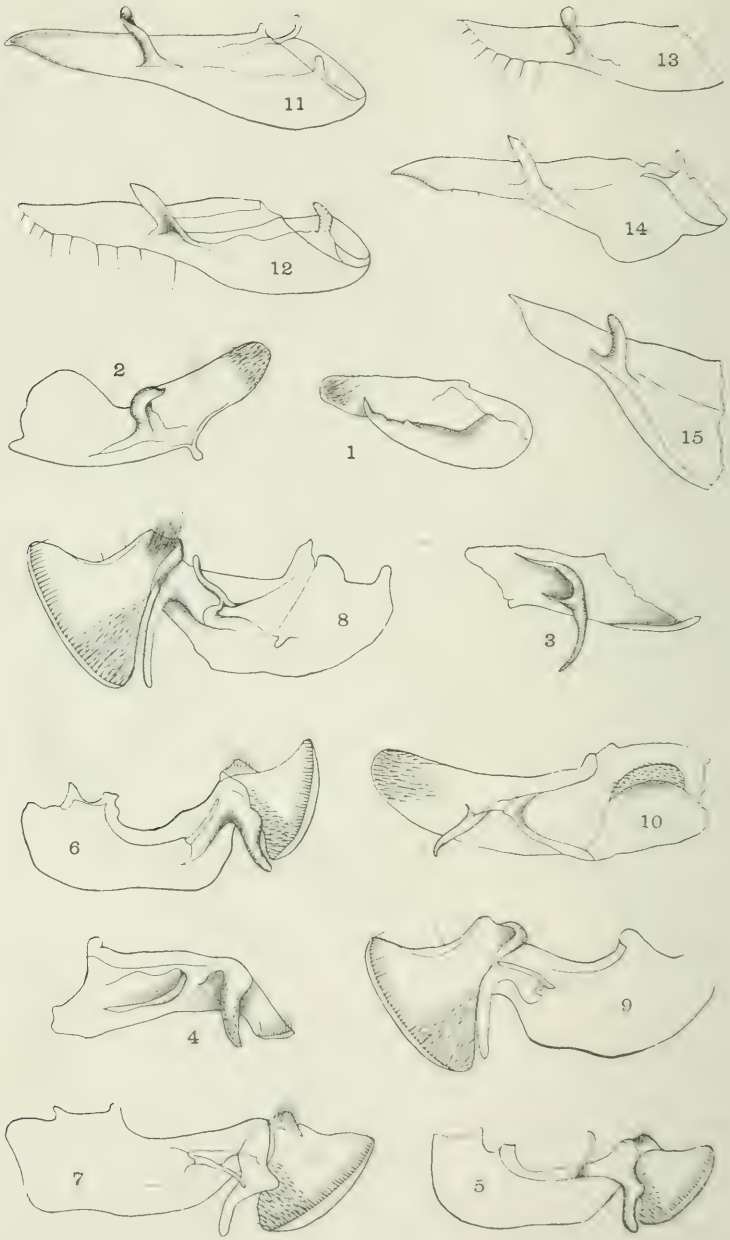
In the Thirty-third Annual Report (1902), page 24, line 13 from the top, for "triangle" read *tangle*.

Page 28, line 15 from the bottom, for "point" read *joint*.

Page 60, line 3, after "*C. 12-punctatus*," read "which has only recently been reported as having invaded Canada, has reached London, which would seem to indicate that it will soon prove itself to be the more abundant and destructive species of the two."

The 33rd Annual Report (1902) of the Society has been published, and is sent by the Ontario Department of Agriculture to the members whose subscriptions are paid up for the year 1903, and to those only. Any subscriber who has not yet received a copy will understand the reason why.

Mailed April 1st, 1903.



NEW NOCTUIDS — FIGURES OF GENITALIA.

The Canadian Entomologist.

Vol. XXXV. LONDON, MAY, 1903. No. 5

NOTES ON CANADIAN SPECIES OF THE GENUS *APANTESIS (ARCTIA)*, WITH SPECIAL REFERENCE TO THE LARVÆ.

BY ARTHUR GIBSON, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

This paper is not by any means intended to be a full treatment of the species of the genus *Apantesis*, occurring in Canada. There is so much yet to be learned about many of the forms that the preparation of such an article is still quite impossible. The intention, therefore, is merely to present the rather incomplete notes we have made at Ottawa, with the hope that they may be of some use to students who are, or who may become, interested in these insects, and also that it may be seen at a glance what work has been done on some of the species, as well as what is still lacking with regard to others. There is considerable doubt as to the validity of some of the species of this genus, and these doubts can only be dispelled by careful and extensive breeding from the egg, taking accurate notes of the larvæ (in their different stages), the pupæ, etc. Large series of many of the so-called species will have to be bred before definite knowledge can be acquired.

The larvæ of this genus, generally speaking, are much the same in appearance. They are usually blackish caterpillars, with spreading tufts of black or reddish bristles. Taking each species separately, they are not difficult to study, but when one begins to compare large series of closely related species, the task is not by any means so easy. Even among those species which have been most studied, we do not seem to have any constant characters whereby to separate the larvæ, and, in view of our limited knowledge of these creatures, a great amount of work is still to be done. As it should not be difficult to obtain most of the moths where they occur, it is to be hoped that local collectors will endeavour to secure eggs from captured females, and thus provide the means for a better knowledge of the earlier stages of these interesting insects.

In Canada there are, as far as we have been able to find out, at least 20 moths belonging to the genus *Apantesis*, and specimens of all of these

have been examined by the writer. Whether some of these are really worthy of specific rank can only be found out by breeding. Undoubtedly, however, some which are now recognized as distinct by some students, will, when they have been reared in numbers from the egg, be found to be simply forms of some recognized species, and not worthy of a specific name. Doubtless, also, some which have been buried in synonymy by other students, will be found, when their earlier stages are sufficiently known, to be worthy of specific recognition.

The following list covers all forms which we know to occur in Canada. Some of these have never been recorded from Canada before, and it is not unlikely that other collectors may be able to add further to this list :

1. *virgo*, Linn.
   " var. *citrinaria*, Neum. & Dyar.
2. *virguncula*, Kirby.
3. *Michabo*, Grote.
   " var. *minca*, Slosson.
4. *parthenice*, Kirby.
5. *rectilinea*, French.
6. *Anna*, Grote.
   " var. *persephone*, Grote.
7. *ornata*, Packard.
   " var. *achaia*, G. & R.
   " var. *ochracea*, Stretch.
8. *argc*, Drury.
9. *Quenselii*, Paykull, var. *turbans*, Christoph.
10. *obliterata*, Stretch.
11. *Bolanderi*, Stretch.
12. *Nevadensis*, G. & R., var. *incorrupta*, Hy. Edw.
13. *superba*, Stretch.
14. *Williamsii*, Dodge, var. *determinata*, Neum.
15. *phyllira*, Drury.
16. *Celia*, Saunders.
17. *figurata*, Drury.
18. *nais*, Drury.
19. *vittata*, Fabricius.
20. *phalerata*, Harris.

The order of the species as given in Dr. Dyar's new catalogue has been followed.

Among the Arctians which have been sent in for examination, there are nine specimens which we cannot satisfactorily place, and it may be that these may prove to be undescribed. It is not advisable, we think, to describe new species of this genus from a few specimens, even if these seem to be fairly constant. When any of these species which are not now very well known, come to be reared in numbers from the same batch of eggs, doubtless many surprises will be experienced, and characters which in the past have been regarded as important by some students, may prove to be anything but constant. In a genus the species of which show such a wide range of variation, great care should be exercised in arriving at conclusions regarding new forms which may appear, and it will only be when every species has been carefully studied from the egg that definite knowledge can be had regarding the insects which constitute this interesting genus of the Arctiidæ.

We have been endeavouring to get some idea of the distribution of the different species, and such results as we have obtained are given below, as well as the dates of appearance of the perfect insects.

1. Virgo.—This species is well known as a moth, and common in many parts of Canada, particularly so in Manitoba and east of that Province. The mature larva is a beautiful creature, and, as might be expected, is one of the largest of the genus. It is 55 mm. in length at rest, 60 mm. when extended, and 8.5 mm. at widest part. In colour it is a deep velvety black, with bunches of stout black barbed bristles from the tubercles on the dorsum, and reddish bristles from the tubercles on the lower portion of sides and on venter. Some specimens are without any markings on the skin, but others have a striking dorsal stripe, the colour varying—bright yellow, dirty whitish, or orange-yellow. This larva also varies as to the colour of the tubercles. In three specimens the writer bred, tubercle i. was black, ii. black (in one specimen this afterwards changed to reddish), iii. black in two specimens, reddish in one, iv., v., vi., vii. and viii. also varying in colour. (Can. Ent., Vol. XXXIV., p. 23.) Abdominal feet brownish-red. Specimens of the larvæ, collected at Rosthern, Sask., by Mr. T. N. Willing, and given to Dr. Fletcher, had all the tubercles of a bright reddish colour, the bristles being all foxy red, or smoky, and the skin of some specimens mottled with gray. Some examples had a creamy yellow stripe down the dorsum, and others had this stripe broken up into a double spot on each segment.

Further examples collected at Rosthern, also by Mr. Willing, changed to pupæ on June 17, producing the imagoes on July 15. These larvæ Mr. Willing says were very plentiful on *Thermopsis rhombifolia*, Nutt. Five specimens which had been killed by a fungus, and which were still attached to the plants, were received at Ottawa, and afterwards one pupa, with cast skin attached, and two of the bred moths were sent for examination. All the tubercles in these six specimens are distinctly reddish, and the bristles conspicuously red, of about the same colour as those of *Isia Isabella*, S. & A. The five dead larvæ all show the dorsal stripe.

Larvæ which the writer received from Toronto hibernated in the penultimate stage. Specimens which Mr. D. Brainerd collected at Montreal moulted twice in the spring, as did also four larvæ found at Ottawa in early April, by Mr. C. H. Young. From data at hand it would appear that there is only one brood in the year. It would be interesting to rear a large number of the larvæ from the egg, and note all the differences.

Distribution.—Edmonton, Alta., July (F. C. Clare); Blackfalds, Alta., July 1, 2 (P. B. Gregson); Rosthern, Sask. (T. N. Willing); Beulah, Man. (A. J. Dennis); Cartwright, Man. July 15–30 (E. F. Heath); Aweme, Man., July 27 (N. Criddle); Winnipeg, Man., July 3–19 (A. W. Hanham); Rosseau, Ont., July (A. F. Winn); Orillia, Ont., July 3–17 (C. E. Grant); London, Ont. (W. Saunders); Hamilton, Ont. (J. A. Moffat); Grimsby, Ont., July 20 (W. Metcalfe); Toronto, Ont., July 15, 17 (A. Gibson); Port Hope, Ont. (C. J. S. Bethune); Trenton, Ont., July 13, 19 (J. D. Evans); Ottawa, Ont., June 29, July 7, 12, 15, 22, 24 (J. Fletcher, C. H. Young, A. E. Richard, A. Gibson); Rigaud, Que. (J. E. Desrochers); Montreal, Que., July 19, 21, 27 (H. H. Lyman), July 6–17 (Chas. Stevenson), July (A. F. Winn); Little Metis, Que. (Winn); Rimouski, Que. (Winn); St. Hilaire, Que., July 15 (Lyman); Quebec, Que. (T. W. Fyles); Kamouraska, Que. (Winn); Bic, Que. (Winn); Chicoutimi, Que., July (Winn); St. John, N. B., June 10, July 2, 17, 21, 26 (Wm. McIntosh).

Virgo, var. citrinaria.—Mr. J. A. Moffat tells me that he has bred two specimens of this variety, which differs in having yellow secondaries, from a batch of larvæ found at the same time at Hamilton, Ont.

2. Virguncula has a wide range of distribution. In Ontario it is a common species in certain districts, but very rare in others. At Toronto during some seasons I have found the moths exceedingly abundant. The life-history of this Arctian was published by the writer in the Canadian

Entomologist, Vol. XXXIII., p. 325. The mature larva is smaller than that of *virgo*, measuring about 35 mm., and when extended 40 mm.; head black, median suture pale in some specimens, as also the lower half of the epistoma. The skin of the body in some examples is wholly velvety black, in others the same colour but shading to grayish black subventrally, The tubercles are all black, the bristles being distinctly barbed, those from the dorsal tubercles being black, while those from the subventral tubercles are bright rust-red; prolegs, upper portion black, lower portion reddish. None of the larvæ had any markings on the skin. Specimens collected on April 8, at Toronto, only moulted once after coming out of hibernation, and at Montreal, Mr. Brainerd tells me that larvæ which he had, moulted only once in the spring before spinning up. From eggs laid in June we reared moths in August, but many of the larvæ which were mature (Stage VII.), instead of changing to pupæ as the others did, stopped feeding about the middle of August and acted as if they wanted to hibernate. *Virguncula* ought to be bred again to see just to what extent the larvæ vary, and if they ever possess the dorsal stripe. The late Mr. T. G. Priddey, of Toronto, made large collections of these larvæ, but, unfortunately, did not publish any of his observations. Writing on March 20, 1901, he says: "Now is the time to get *Arctia virguncula* larvæ. The first soft day after the dry grass is released from the frozen snow, they generally show themselves for a short time, along with *Spilosoma virginica*, basking on the tops of grass; after then they are hard to find, as they hide away during the day."

Distribution.—Calgary, Alta., July 27, Aug. 18 (F. H. Wolley-Dod); Saltcoats, Assa., July 12 (Willing); Cartwright, Man., June 29, July 3 (Heath); Sudbury, Ont. (Evans); London, Ont. (Saunders); Orillia, Ont., July 5–10 (Grant); Wabigoon, Ont., Aug. 24 (W. McInnis); Toronto, Ont., June 6, 14, 16, 18, 23 (Gibson), June 16, 24 (W. Metcalfe), May 23, June 6 (J. McDunnough); Hamilton, Ont. (Moffat); Trenton, Ont., June 19 (Evans); Ottawa, Ont. Aug. 5 (Gibson); Meech Lake, Que., Aug. 25, 3 worn sp. (Young); Montreal, Que. (Brainerd), July 3 (Lyman), May 24, June 13 (Winn); Cowansville, Que. (Fyles); St. John, N. B., July 9, "rare" (McIntosh); Anticosti Island (W. Couper).

The specimen of the moth which the writer found on the 5th Aug., at Ottawa, was not a complete specimen, but simply one of the primaries of presumably a male, which had become caught in the gauze covering

one side of a mating cage, in which were two males and two females of *nais*.

3. Michabo.—This species must be very rare in Canada, as we have records of only four specimens having been taken. A coloured figure of the moth is given on plate XLVIII. of Hampson's recent "Catalogue of the Lepidoptera Phalænæ in the British Museum." Not having seen a good series of this species, I take the liberty of quoting from Dr. Dyar (Jour. N. Y. Ent. Soc., Vol. VIII., p. 36, as follows: "*Michabo* is a peculiar form, in markings close to *virgo*, but in colour so near *argc* that the two are liable to be confused, and have been so in some collections. It is a simpler form than *argc*, the bands retaining their usual shape, only the inner one being occasionally somewhat tooth-like" . . . . . "The larva doubtless hibernates full-grown. No description is extant, but fortunately I have a blown larva before me from the Riley collection, as well as cast skins from the Department of Agriculture, and some notes (Dept. Agr. No. 2588). The larva is grayish black, head black, the body rather grayish brown, with a broad, distinct, straight, cream-coloured dorsal stripe. Hair rather long and, though coarse, somewhat soft and brownish. Spiracles white. The notes add a more or less interrupted white subdorsal line, but it does not show in the blown or alcoholic specimens nor in the cast skins. The larva is a close ally of *argc*, but differs in the absence (or reduction) of the subdorsal lines. The full life-history is needed."

Distribution.—Grand Forks, B. C., June (H. Brainerd). This specimen is in the collection of Mr. A. F. Winn, of Montreal, who kindly gave me the particulars. Calgary, Alta., June 9 (Wolley-Dod); Aweme, Man. (Criddle).

Michabo, var. minea.—A single specimen of the variety, which has been so identified by Dr. Dyar, was sent from Osoyoos, B. C., to Dr. Fletcher by Mr. C. deBlois Green.

4. Parthenice is by no means uncommon. The moths appear usually in late July and August, generally about the middle of the latter month. Small specimens of *virgo* are often confused with *parthenice*, but the former species can readily be distinguished by the broad lining of the median vein, and the two, or more, discal spots of the secondaries. *Parthenice* has but one discoidal spot. I have never seen the larva of this moth. Saunders describes it as black, with a flesh-coloured dorsal stripe, tubercles yellowish, bearing tufts of stiff hairs which are black on the dorsum and brown on the sides, and feet and prolegs yellowish, tipped with black

The life-history of this species is needed, and, as the moths are fairly common, it ought not to be difficult to obtain eggs. Males of the species were abundant at light, near Ottawa, in August last, but, unfortunately, no females could be captured, or doubtless we could have secured ova.

Distribution.—Victoria, B. C., June 27 (E. M. Anderson); Calgary, Alta., July 23, 25 (Wolley-Dod); Blackfalds, Alta, August (Gregson); Prince Albert, Sask., July 6 (Fletcher); Beulah, Man., July 15, 21, 22 (Dennis); Aweme, Man. (Criddle); Winnipeg, Man., July 18, 19, 27 (Hanham); Cartwright, Man., July, Aug. (Heath); Sudbury, Ont., July 27 (Evans); London, Ont. (Saunders); Amherstburg, Ont., early Sept. (E. B. Reed); Hamilton, Ont. (Moffat); Cæsarea, Ont., Aug. 12 (Gibson); Grimsby, Ont. (Metcalfe); Toronto, Ont. (Bethune, Gibson); Cobourg, Ont. (Bethune); Port Hope, Ont. (Bethune), Aug. 13 (Metcalfe); Rosseau, Ont., July 28 (Winn); Orillia, Ont., Aug. 10, 17, 18, 31, Sept. 2 (Grant); Trenton, Ont., July 30, Aug. 23–27 (Evans); Ottawa, Ont., Aug. 6, 10, 13, 14, 16, 19, 27 (Fletcher, Young, Richard, Gibson); Meech Lake, Que., Aug. 16, 19, 22, 31, Sept. 6, fresh specimen (Young); Rigaud, Que. (Desrochers); Montreal, Que. (Brainerd), Aug. 9 (Lyman); Murray Bay, Que., Aug. (Winn); Roberval, Que., July 27 (Lyman); Little Metis, Que., July, Aug. (Winn); Quebec, Que., Aug. 6 (Fyles); Jaquet River, N. B., August (Winn); St. John, N. B., Aug. 1–15 (McIntosh).

5. Rectilinea.—This Arctian is very rare in Canada. We have only three records of its occurrence. The species is supposed by some to be the same as *phyllira*, and larvæ which the writer had from eggs, with the female *rectilinea* correctly associated, certainly answered very well to the description of the larva of *phyllira* as published by Packard. The eggs of *rectilinea* above mentioned were received from Mr. A. Kwiat, of Chicago, and were laid on the 27th and 28th Aug., and hatched on the 5th and 6th Sept. The following notes were taken on the larval stages:

Stage I.—Length when hatched 1.8 mm. General colour dirty whitish, after feeding greenish brown. Head 0.3 to 0 37 mm. wide, black, mouth-parts reddish. Thoracic shield black. Tubercles blackish; bristles long, blackish from dorsal tubercles, and silvery from lateral tubercles. Tubercle i. very small, ii. and iii. large, of about same size, iv. and v. smaller than ii. and iii.; i., ii., iii., iv. and v. are surrounded more or less with reddish brown. In some specimens this colour is hardly perceptible. Bristles from tubercles barbed. Thoracic feet black; prolegs rather paler than venter, semi-translucent.

Stage II.—Length 3 mm. Head 0.4 to 0.45 mm. wide, black, shiny, slightly bilobed; mouth-parts reddish. Body pale brownish, the green food contents showing slightly, more or less, through the skin. Tubercles all shiny black, and large, with exception of i., which is very small; each tubercle but i. bearing a bunch of barbed bristles, those from the dorsal tubercles black, others silvery, or whitish. All the segments are marked with reddish brown blotches and spots. Spiracles black, very small, almost touching tubercle iv. Thoracic feet darker than venter and rather translucent; prolegs paler than venter, setæ short and pale.

Stage III.—Length 6 mm. Head 0.6 to 0.67 mm. wide, black, shiny. In general appearance the larvæ may be said to be black, with pale, slightly yellowish, dorsal, lateral and stigmatal stripes. On examination with a lens, however, the skin is seen to be pale, but thickly mottled and suffused with dark brown. All the tubercles are shiny black, and, with the exception of i., large. Tubercles as before, ii. with a polished base. Bristles black, with exception of those from lower lateral tubercles, which are pale. Tubercles on dorsum of segments 12 and 13 bear a few extra long bristles. Thoracic feet shiny black; prolegs concolorous with venter; setæ pale and short. Towards the end of the stage the larvæ lose their dark colour, changing to a reddish brown.

Stage IV.—Length 7.5 mm. Head 0.9 to 1.0 mm. wide, black. In general appearance black larvæ with black bristles, and a pale yellow dorsal stripe, also an indistinct lateral stripe. The skin on the sides of body shows some green, the venter being paler. Tubercles black, bristles barbed, from all tubercles above spiracles pure black. Bristles from lower tubercles mostly pale, rather reddish. Dorsal stripe clear pale yellow, expanded almost into a spot on the middle of each segment. Spiracles small and black. Thoracic feet shiny jet black, prolegs concolorous with venter.

Stage V.—Length 10.5 mm. Head 1.2 mm. wide, black, cheek above ocelli brown; epistoma pale. Body black; dorsal stripe as in last Stage, skin between tubercles ii. and iii. yellowish. Tubercle i. small, ii. large, both i. and ii. black, ii. with a polished base; iii., iv. and v. are now partly brownish yellow, vi., vii. and viii. wholly black. Skin of body below tubercle ii. not so black. Spiracles small, black, round, just in front of tubercle iv. Bristles from tubercles as before, but the pale bristles below spiracles, in some specimens, do not show any red. Thoracic feet as before; prolegs, upper portion shiny black exteriorly, paler below.

Stage VI.—Length 15 mm. Head 1.6 mm. wide, as before, median suture in some specimens pale. In general appearance the larvæ in this Stage are black, hairy caterpillars, either with a dorsal stripe (indistinct or absent on posterior two segments of body) of bright yellow, expanded almost into spots as in Stage iv., or a series of spots, one on each segment, down the middle of the dorsum. In all specimens along the upper portion of sides is also a series of paler yellowish spots. Tubercles as in last Stage, the summits of iii., iv. and v. being pale brownish yellow. Bristles from dorsal tubercles black. In most specimens those from iv. are black, from v., vi., vii. and viii. pale, slightly rusty. Thoracic feet black, shiny; prolegs, upper two-thirds black, lower third pale greenish brown; claspers blackish gray.

Stage VII.—Length 21 mm. In general appearance, black hairy larvæ, with a row of small yellow spots down the dorsum, and conspicuous rows of yellowish subdorsal and lateral tubercles. Head 2.0 mm. wide, subquadrate, flattened in front, slightly bilobed, shiny black; ocelli black; epistoma dull whitish-brown; cheek above ocelli near segment 2 pale brownish; antennæ whitish-brown at base, remainder blackish. Body cylindrical, segments rather deeply divided. Skin dull grayish black, overlaid with patches and streaks of rich velvety black, particularly dorsally and laterally, giving a deep black appearance. Dorsal stripe broken up into a row of yellow spots. All the tubercles, with but few exceptions, yellowish, with a black base, the subdorsal and lateral series most conspicuous. Tubercle i. small, about one-ninth the size of ii., which has a broad polished base. Spiracles black, with a dull yellowish centre, close in front of tubercle iv. Bristles barbed, those on dorsum mostly black, on lower portion of sides pale. Thoracic feet black, shiny; prolegs pale, each with a large black shiny plate anteriorly.

The above larvæ when they stopped feeding were put outside for the winter. Unfortunately, however, none of them came through alive, so we were unable to breed a series of the moths. Possibly some of us may again be fortunate enough to obtain eggs, and rear the species to maturity.

Distribution.—Calgary, Alta. (Willing); Beulah, Man., July 14 (Dennis); Aweme, Man., Aug. 6 (Criddle).

6. Anna.—This species also seems to be rare in Canada. In 1896 I collected six specimens of the variety *persephone*, and at that time associated them with *virgunculu*, probably because they occurred at the same time, and I thought bore a somewhat close resemblance to that species.

Persephone, however, is a larger form than *virgunculu*, and the fore wings are more like those of *parthenice*, but the markings are much heavier. *Anna* differs from the variety *persephone* chiefly in having the hind wings wholly black. The larval stages of the *persephone* form were described by Dr. Dyar in Vol. 8, p. 53, of Psyche. These larvæ were entirely deep black, with shining tubercles, and stiff black bristles alike in colour throughout. We have never had an opportunity of studying the earlier stages of this species at Ottawa, as it does not occur here to our knowledge. Some of our members may be fortunate enough some time to get ova, and if so it would be interesting to know just to what extent the larvæ vary.

Distribution.—Typical *Anna* has been taken at Toronto, Ont., June 20 (Metcalfe), and at London, Ont.; the variety *persephone* at Hamilton, Ont. (Moffat); Toronto, June 6, 27 (Gibson), June 3, 4 (McDunnough); June 18 (Metcalfe); Springfield-on-Credit., Ont. (Bethune).

7. Ornata.—This is a western species occurring in Canada, as far as we know, only in British Columbia. It is a rather large, handsome Arctian, some specimens measuring 1¾ inches in expanse of wings, but the average width is 1½ inches; a series of the moths will show great variation. Typical *ornata* seems to be rare, most of our specimens and those we have seen being either the form *achaia* or *ochracea*, of which the veins on the primaries are lined. The colour of the secondaries in the species varies from yellow to red. During the past summer Mr. J. W. Cockle, of Kaslo, B. C., kindly sent us a batch of eggs of *ornata*.* These were laid on the 30th June and hatched on the 8th July. The following notes were taken on the larval stages:

Stage I.—Length at first 2.2 mm. Colour whitish, after feeding greenish. Head 0.4 to 0.45 mm. wide, dark brown, shiny. Cervical shield concolorous with head. On each segment there is the usual row of transverse tubercles; these are black; i. small, ii. large, iii. nearly the same size as ii., iv. and v. smaller. Setæ long and slender. Tubercles ii., iii., iv. and v. are faintly surrounded with reddish brown. Feet concolorous; thoracic feet semi-translucent.

Stage II.—Length 4 mm. Head 0.5 to 0.6 wide, pale brown, darkened at inside apex of cheeks; ocelli black; mouth-parts reddish. Body pale greenish, with a light bluish dorsal stripe. Cervical shield and

*The female which laid the eggs has since been received, and submitted to Dr. Dyar, who has confirmed our identification.

tubercles black, shiny; tubercles ii., iii., iv. and v. as in last Stage, blotched anteriorly and posteriorly with reddish brown. Mostly black bristles from i., ii. and iii., the others silvery; from lower tubercles mostly silvery bristles, only a few black ones. Bristles barbed. Spiracles black, small, close in front of tubercle iv. Feet concolorous with venter, semi-translucent.

Stage III.—Length 6 mm. Head 0.75 to 0.9 mm. wide; inside half of cheek dark brown, outer half pale brown; ocelli black; mouth-parts reddish-brown; some heads much darker than others. In general appearance the larvæ are brownish caterpillars, with a pale blue dorsal stripe. The tubercles are black and shiny; bristles barbed, from i. and ii. all black, except on thoracic segments, where there are a few silvery bristles; from iii. and iv. mostly black, a few silvery; from lower tubercles mostly silvery. Tubercle i. small, ii. large and with a polished base. Skin of body from the dorsal stripe to lower edge of tubercle ii. pale brown, with a greenish tinge. Between ii. and iii. the skin is pale greenish-yellow, and between iii. and iv. and below iv. the skin is blotched with brown. Venter greenish. Feet semi-translucent. Segments 11, 12 and 13 bear a few very long silvery hairs.

Stage IV.—Length 8.5 mm. In general appearance dark brown, with a pale, bluish-yellow dorsal stripe. Head 1.0 to 1.1 mm. wide, as in last Stage. Tubercles and bristles as in last Stage, some very long slender hairs from segments 12 and 13. Spiracles small, black, close in front of tubercle iv. Later in the Stage the larvæ, under a lens, appear as greenish caterpillars, rather densely blotched and splashed with reddish-brown, and the dorsal stripe loses to a great extent its bluish-yellow colour, becoming rather inconspicuous. The skin along the side just above tubercles iii. and iv. has a yellowish tint. Thoracic feet brownish, rather translucent; pro-legs concolorous with venter.

Stage V.—Length 12 mm. Head 1.2 to 1.3 mm. wide, shiny, black, with exception of brownish patch just above ocelli. Skin under a lens is brownish, bearing blotches of velvety black. A few days after moulting the blotches are more of a dark purplish shade, or a dull reddish brown. In most specimens the dorsal stripe has disappeared, but in some it is still apparent under a lens. Tubercles as in last Stage; bristles faintly barbed. The bristles from tubercles i., ii., iii. and upper half of iv. are black, those from lower half of iv., and from v., vi., vii. and viii. pale rusty. Spiracles small, black, close in front of tubercle iv. The two posterior segments

bear some extra long slender hairs as before. Venter much paler than dorsum, of a greenish-brown tinge. Thoracic feet shiny black; prolegs concolorous with venter.

Stage VI.—Length 17 mm. Head 1.4 to 1.6 mm. wide, subquadrate, slightly depressed at vertex; black, shiny; epistoma pale; mouth-parts reddish; setæ black and slender; cheek above ocelli pale brownish, mottled with darker brown. Skin of body velvety black on dorsum, grayish-green ventrally. No markings on the body. Tubercles black; bristles from i., ii., iii. and iv. black, those from v. and lower tubercles pale rust-red; bristles faintly barbed. Some long, slender bristles from dorsum of two posterior segments as before. Thoracic feet black, shiny; prolegs reddish. Larvæ do not vary.

On the 3rd September 21 specimens were living, and as they were not feeding very much and looked unhealthy, they were put outside. Later, when they were examined (25th Oct.), every specimen was found to have died. Mr. Cockle retained some of the eggs himself, but he has since told us that his larvæ also suffered a similar fate. Possibly during the coming season eggs may again be secured and more successful results obtained. Mr. Cockle states that the moths are rare at Kaslo.

Distribution.—Specimens of *ornata* have been taken at Osoyoos, B. C. (C. de B. Green); Kaslo, B. C., June 30, July 2 (Cockle); of the form *achaia* at Osoyoos, B. C. (Green); Kaslo, B. C., July 25, 26 (Cockle); of the form *ochracea* at Kaslo, B. C., June 8 (Cockle); Victoria, B. C. (Fletcher), June 7, July 17 (Anderson).

8. ARGE is well known, and rather widely distributed in the eastern part of Canada, though I do not think it can, with us, be considered a common species. It seems to be double-brooded. We have no records of any specimens having been taken west of the Province of Ontario. An interesting account of the species has been recently published by Dr. Seifert,* accompanied by an excellent plate showing the variation in the imagoes. The mature larva measures nearly 1¾ inches in length, and is grayish black, overlaid, especially on the dorsum, with patches of velvety black. The dorsal and subdorsal bands are cream colour, shaded with pink, and are wide and very distinct. The infra-stigmatal band is nearly the same colour, but is waved and broken, and not nearly so distinct. The tubercles are dull blackish, not polished. The bristles are faintly barbed and rather long, brownish or gray, excepting those from lower

*Journal of the New York Entomological Society, March, 1902.

lateral tubercles, which are rusty. Full-grown larvæ have been infrequently met with at Ottawa in early October.

Distribution —Hamilton, Ont. (Moffat); Toronto, Ont. (R. J. Crew, Gibson); Trenton, Ont. (Evans); Ottawa, May 27, 28 (Young), Aug. 27 (Fletcher); Rigaud, Que. (Desrochers); Montreal, Que., July 15 (Stevenson), Aug. 12 (Norris); Belœil, Que. (Brainerd).

(To be continued.)

A DAY'S COLLECTING IN FEBRUARY.

February 12th (Lincoln's Birthday), of this year, was unusually warm and spring-like. The temperature rose as high as 52°, and the clear sky and little wind made it a joy to be out in the open, in the sunshine.

I went to Staten Island that day, with the intention of working up some Orthoptera with Mr. W. T. Davis, but the feel of spring in the air was irresistible, and as I was anxious to secure aquatic Hemiptera as early in the season as possible, we went by trolley to some woodland ponds near Richmond. The fields were very wet on the way, but hopping among the dry leaves were young grasshoppers, emerged from their winter's sleep. Some Diptera also were hiding among them, and they were quite active when disturbed.

When we arrived at the pond, a disappointment awaited us. It was nearly all frozen over! However, we pushed through the brambles to the edge, and began to fish under the thin ice. I took on this side of the pond two *Corixa Harrisii*, active. Working our way along the side to the end where the outlet was, we found the water free from ice. On the surface, two species of Podurans were abundant, and an immature Jassid was floating and jumping. We got none of these. Water beetles, also, were swimming about.

The sun, meantime, was melting the ice, and as we got to the opposite side from where we started, quite half the pond was clear. On this side, Haliplidæ and Dytiscidæ were more abundant, swimming freely or else clinging to the stems of the bushes rising from the water, sunning themselves.

On the trunk of a white birch I saw an *Acilius semisulcatus*, about six inches from the surface, on the sunny side. It was alarmed by the noise I made, and dropped into the water. Contrary to what seemed to be the rule, this beetle submerged itself with great ease.

Here, also, I took a Haliplid from a bush, on which there were a

number resting an inch or two from the water. These, however, seemed to be somewhat torpid, as they could be brushed into the net easily, and lay there motionless. Those that fell into the water seemed to experience great difficulty in getting under. We also took two other species of these and a small Hydrophilid, swimming.

As we sat at lunch, several species of Diptera were flying about. We also saw a Hemerobian and one of the Microlepidoptera, which we failed to catch.

We had by this time exhausted the possibilities of this pond, so went to another about a hundred feet away. This was even more disappointing. Thick ice covered it everywhere, except around the roots of a large apple tree, where there was a clear space of about a foot. This was swarming with the Crustacean *Branchippus*.

I wanted to get some Hydrobatidæ, as well as more of the other aquatics, and Mr. Davis suggested Richmond Brook, where we went across fields. The earth was simply sodden.

In the brook there was more life and better collecting. *Gerris remigis* was quite abundant, active, and, in some instances, *in copulo*. Between Mr. Davis and myself we took about 30 specimens. They were found in the backwaters under the overhanging banks, or hiding among the drift.

Clinging to the grains of sand or to small pebbles, in the quieter, deeper portions of the stream, were numbers of another species of *Corixa*, which I have not as yet determined. These insects were exceedingly active and lively, and scurried away before the net like a flock of birds, but we caught many, nevertheless.

On the surface, in some portions, a small Perlid, *Capnia necydaloides*, was to be seen lightly floating. One I took from a *Gerris* that was feeding on it. Several others Mr. Davis and I took as they floated on the water, and two were caught on the white surface of a recently-cut stump, which seemed to have a great attraction for them. When we sought to capture them they ran swiftly away without attempting to take flight, and hid in the cracks of the bark, with which they harmonized in colour.

We also observed some Chironomids resting on the stream; and under stones and among trash at the bottom, Perlid nymphs and Ephemerid larvæ were abundant. In a sandy, shallow spot we saw a number of tubes, possibly about two inches long, rising into the water from the bottom, but we did not find the maker. These seemed to consist of silk,

and were coated with grains of sand, which made them about the thickness of a pipestem.

When we left the brook on our return home, we felt that we had had a very successful day. We had gone really on a venture, and we had found much more than we expected, and had a delightful outing into the bargain.

In the early Spring, on such days as this, aquatic insects can be very profitably collected, especially for life-history work. They are active long before any others, as soon as the ice begins to disappear, and present a practically unexplored field to the earnest entomologist. To the mere collector they offer no inducement to compensate for the labour of collecting them, and are exceedingly uninteresting, being ordinarily inconspicuous, sombre in coloration and retiring in habit. But to the scientific worker they present some of the most interesting adaptations to environment and conditions in the entire field of entomology.

Two days later I went to the Mosholu locality in this vicinity, and my experience there illustrates this point. Although I spent a good deal more time there, I saw but few insects flying, all Diptera. My catch was all Coleoptera, none active, all hibernating under stones, and consisted principally of Staphylinidæ, some Carabidæ, one Elater; and also, one active Jassid, undetermined. It was not as good in numbers or variety as the one of the 12th, although the latter locality in Summer is very rich in species and abundant as to numbers.

J. R. de la Torre Bueno, New York.

ÆGIALITES DEBILIS, MANN.

Leconte and Horn, in their "Classification," say of this beetle: "It is of such extreme rarity as to have been seen by but few entomologists." It was with considerable interest, therefore, that I captured my first specimen one March afternoon in 1894. I was lying on a pebbly sea beach, turning over stones, when I came upon *Æ. debilis* on the under side of a stone. From Leconte's description I felt pretty sure that my identification was correct, and it was subsequently confirmed by Dr. Fletcher, of Ottawa. Leconte says the beetle is black, but he had probably seen only dried specimens. Freshly-taken specimens show a distinctly green tinge. The insect is about .15 inch long, and in general shape suggests a small carabid.

Many a subsequent search in the same locality proved fruitless, for the insect's proper habitat, as I afterwards discovered, is not among loose

stones. It is essentially a rock-frequenting species. It occurs in large numbers in some conglomerate boulders on the northern shore of the Queen Charlotte Islands. These boulders lie about half-way between the tide-marks, and the large pebbles embedded in them have become loosened by the action of the water, but still remain in their matrices. It is between these pebbles and the matrices that the beetles live, their compressed forms admirably adapting them for moving in so confined a space.

On the mainland of British Columbia, opposite the Queen Charlotte Islands, the beetle again occurs in considerable numbers. There the shore rocks are of a slaty formation, and the action of the tide tends to separate portions of them into large flakes, beneath which the beetles find congenial shelter. On removing one of these flakes with a chisel a whole colony of *Æ. debilis* is disclosed. I feel sure that the insect might be discovered in many places along our Pacific coast, if carefully sought for. For a long time this beetle was the only representative, not only of its genus, but of its family. Professor Comstock states, however, in his Insect Manual, that another species has recently been taken in California.

The beetle is active all the year round. This morning (Feb. 14th), wanting to examine a few living specimens, I had no difficulty in procuring all I needed, though the ground is frozen hard and covered with snow. I have seen it copulating in February, and have taken both larvæ and pupæ in July. It is extremely deliberate in its movements. Its sharp claws enable it to adhere so firmly to the surface of the rock that it is sometimes difficult to dislodge it without injury. Unlike other marine species with which I have experimented, it shows no objection to entering the water, but does so readily from the top of a half-submerged stone. It seems helpless when floating on the water, but can sink at will when once beneath the surface. I placed some specimens on a stone in a dry dish, and gradually added sea-water till the stone was submerged, imitating the approach of the tide. The beetles remained stationary, and allowed the water to cover them, when a large bubble of air could be seen under their partly raised elytra.

I am in want of a few popularly interesting beetles (*e. g.*, glow-worm, fire-fly, Egyptian sacred beetle, Pyrophorus, Noctilucus, etc.) for use in lectures to young people. I would gladly send a series of *Æ. debilis* to any entomologist who might care to make the exchange.

J. H. Keen, Metlakatla, B. C.

NEW NOCTUIDS FOR 1903, No. 3—WITH NOTES ON SOME DESCRIBED SPECIES.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, N. J.

The first paper of this series is in the January number of this Journal (pp. 9-14); the second is in the April issue of the Journal of the New York Entomological Society. The present instalment deals chiefly with species found in the Western Provinces of British America and a few others that are likely to occur there. The determination of a new species of *Rancora* from Calgary and Manitoba makes some general remarks on that genus timely. There is a number of excellent collectors now hard at work on the Noctuid fauna of that general region and extending westward to Vancouver, whose work deserves the greatest praise and to whose efforts is due the development of a totally new faunal region for this family of moths.

Acronycta tartarea, n. sp.— Head, thorax and outside of tibiæ blackish; orbits of the eyes nearly white. Primaries uniform, very deep smoky, almost black; the maculation neatly written in velvety black. There is a black basal streak to the t. a. line, which is most obvious at this point, fading toward the costa and inner margin; there is a little spur at the middle of the streak beneath, and above it is bordered by a narrow white line. T. a. line almost obsolete, geminate, outwardly oblique. T. p. line velvety black, preceded by a whitish shade, broken, squarely exserted over the cell, deeply incurved below, the black lunate mark in the submedian interspace forming the most prominent part of the wing. A black streak begins just within the centre of this mark, crosses it and reaches the outer margin above the inner angle. Three white costal dots between t. p. and s. t. lines. S. t. line whitish, diffuse, broken, followed by small black interspaceal spots. A series of black terminal lunules, preceded by whitish shadings. Fringes smoky at base, outwardly white. Orbicular moderate, round, black-ringed, inwardly edged by white scales. Reniform rather large, broadly lunate, narrowly outlined in black, inwardly edged by sparse white scales, centre a little brown tinged. Secondaries white, with a smoky outer border, broadest at apex, and nearly lost at anal angle. Beneath: primaries smoky, the margins paler; a vague pale extra-median line. Secondaries more powdery, with a distinct discal spot.

Expands.—1.40 inches–35 mm.

Habitat.—Calgary, Alberta, June 23, head of Pine Creek.

One almost perfect male from Mr. F. H. Wolley Dod. This is, to my mind, one of the handsomest of our species of *Acronycta*. It resembles a somewhat undersized very dark even *grisea*; but it is actually nearer to *falcula* in structure and details of maculation. I have never seen any tendency in either *grisea* or *revellata* to vary in this direction and believe I have a good species.

Noctua Trumani, n. sp.—Ground colour luteous brown, varying a little from a rusty to a smoky tinting. The head and the tips of the palpi may be paler, more yellowish. Thorax concolorous, collar and patagiæ fairly marked, vestiture rather loose, hairy, with the scaly admixture slight. Primaries without contrasts save that sometimes the reniform, and more rarely the orbicular, are obviously paler than the rest of the wing. All the usual lines are present, slender, brown, very slightly relieved. Basal line single, slender, evenly curved, tending to become lost in the darker specimens. T. a. line single, slender, somewhat irregular, a little outcurved in the interspaces, and as a whole a little outwardly oblique: it tends to become lost in the darker examples. T. p. line single, slender, blackish, crenulate, in course parallel to the outer margin, tending to break up into a series of venular dots, which are obvious in all the specimens before me. S. t. line pale, rather even, somewhat diffuse, preceded by a slightly darker shading in the s. t. space, and sometimes further relieved by a darker tint in the terminal space: the tendency is to obscure the line, and in one example it is marked only by the dusky s. t. shade. A dusky terminal line and a yellow line at the base of the dusky fringes. A dusky, somewhat diffuse median shade is obvious in some specimens, extending from the costa between the ordinary spots and from the lower edge of the reniform nearly direct to the inner margin. This shade may be entirely lost, but usually the darkening of the cell between the ordinary spots remains, and even more generally the dusky shade at the lower end of the reniform. Claviform indicated in one specimen only by a line of darker scales, and may be said to be wanting. Orbicular round or a little oval, moderate in size, more or less completely outlined by dusky scales, sometimes annulate with yellowish and sometimes entirely paler than the ground colour of the primaries. Reniform of good size, kidney-shaped, the sides defined by dark scales, upper and lower margins often indefinite, middle of the spot more or less obviously yellow, sometimes contrasting quite strongly, sometimes scarcely relieved from the ground. Secondaries in the male pale yellowish, veins smoky,

with a smoky outer border, through which there is a more or less obvious yellowish shade line: in the female the wings are uniformly smoky, with somewhat contrasting yellowish fringes. Beneath, primaries smoky brown, paler outwardly, more or less powdery, with a more or less obvious smoky outer line: secondaries pale dirty yellowish, powdered along the costa, with an outer extra-median smoky shade line that may cross the costal region only and rarely attains the inner margin.

Expands.—1.20–1.36 inches = 30–34 mm.

Habitat.—Volga, South Dakota.

Four males and one female, in fair condition. Some time before his death the late Judge P. C. Truman sent me several boxes of Noctuids, supposedly duplicates, intended to give me an idea of the general character of his local fauna. The specimens were unmounted and were picked over from time to time to get such species as were being studied. Recently the entire material has been spread, and I find in it the species here described, obviously resembling the *rubifera* series of *Noctua*, but differing from all in the robust build, subequal stumpy primaries and yellowish secondaries, which, in the male, have a broad outer dark shade, in which is a yellowish band. The male antennæ are distinctly ciliated, and the genitalia are unique in having at the lower margin of the harpes a prominent tooth-like process. The tip is gradual, somewhat pointed, and has a dense brush of spinules. The clasper is very stout, short, curved, abruptly drawn into a slender pointed tip. The single median lines, and especially the crenulate t. p. line, are characteristic, while the first impression gained by the wing form is that of a *Taeniocampa* belonging to the *rufula* series.

It is more than probable that this species will be found in the collections of those who have made exchanges with Judge Truman, and it is almost certain to be represented in the collection left by him.

Feltia obliqua, n. sp.—Ground colour ranges from dark luteous brown to smoky or even blackish brown. Head rusty brown, with a more or less obvious dusky line across the front. Collar inferiorly dark brown, limited above by a black line: upper half pale brown, based by a whitish line that serves to relieve the black central line which it borders. Thoracic disk paler than primaries, with a grayish tinge. Primaries very evenly coloured, except that the upper half of wing to the t. p. line is somewhat darker, the markings neatly written and not contrasting. Basal line geminate, black, marked over costal area only, very close to the root

of the wing. T. a. line geminate ; inner line scarcely defined, outer line black, included spaces usually a very little paler ; in course inwardly oblique from the costa to the internal vein, then with a long outward tooth that nearly or quite reaches the middle of the margin. T. p. line geminate, inner line black or blackish, crenulate ; outer line obscure, even, punctiform or entirely lost beyond the costal region : the line as a whole very little outcurved over cell. S. t. line very narrow, pale, strongly denticulate, preceded or followed or both by black sagittate marks, which may be wanting ; the line itself sometimes becoming almost lost. A continuous black terminal line, followed by a pale line at the base of the fringes. Orbicular oval, decumbent, of the ground colour, more or less completely outlined by black scales. Reniform small, somewhat kidney-shaped, concolorous, outlined in black or brown. The cell between the spots is black, and a black line extends beyond the reniform to the t. p. line. A black streak or mark extends from the base to the t. a. line, and has attached to it a small, black-margined claviform. There is a diffuse smoky median shade, variably distinct, which crosses from below the reniform close to and parallel with the t. p. line. Secondaries smoky fuscous, a little paler basally in the male. Beneath gray, powdery, with a more or less complete outer line ; secondaries also with a discal spot.

Expands.—1.20–1.36 inches = 30–34 mm.

Habitat.—Calgary, Alberta, head of Pine Creek, May 31, June 16 ; mouth of Fish Creek, June 3, at light : Mr. F. H. Wolley Dod.

This is a small species of the size of *gravis*, with the general *Vancouverensis* type of maculation. The very even colouring on which the maculation is neatly written will serve to define this form. Mr. Dod has sent me two males and two females, no two exactly alike in colour, yet forming a pair of light brown and a pair of dark brown examples. It is probable that the range of variation will prove greater than the series before me indicates.

Feltia Hudsonii, n. sp.—Ground colour, pale ashen gray. Head varying to brown ; without distinct markings. Collar brown, with a black, central transverse line, above which is a whitish line : the tip also paler. Disk and patagiæ edged and marked with brownish. Primaries more or less suffused with smoky or blackish. The gray shading obtains through the costal region, along the inner margin, below the median vein, in the subterminal space, and at apex. The orbicular is V-shaped, open to the costa, and of the same general gray colour. The reniform is moderate in

size, oblique, lunate rather than kidney shaped, pale yellow in colour. The claviform extends almost across the median space, is black margined, and filled with blackish. The basal line is gray, margined on each side by black scales, obvious on the costa, and inwardly oblique through the cell. The t. a. line is obvious as an upright, yellowish line through the cell. T. p. line gray through the costal area and over the cell; then chiefly marked by the contrast between the median and s. t. spaces. S. t. line marked only by the contrasting dark terminal space, which is crossed by white rays on veins 3 and 4. There is a broken, black terminal line, and a yellowish line at the base of the fringes. Secondaries white, becoming smoky at the outer margin, glossy, with white fringes. Beneath, primaries smoky, except along the inner margin, where they are white. Secondaries white, with a smoky patch at apex, which tends to form a smoky outer margin.

Expands.—1.28 – 1.40 inches = 32 – 35 mm.

Habitat.—Calgary, Alberta, head of Pine Creek, August 7, 16, at light: Mr. F. H. Wolley Dod.

One ♂ and four ♀ ♀ are at hand, all in very nice condition. Mr. Dod originally sent me this species among some examples of *subgothica*, which it resembles at first sight. It is, however, decidedly smaller, more slenderly built throughout, much paler in colour, with white secondaries in both sexes. The antennæ of the male are less obviously "brush-like" than in the allies, and, all together, the new form is perhaps the best defined of any in this series. I cannot recollect having seen this from any other or previous source.

Carneades maimes, n. sp.—Ground colour brown, variably tinged from luteous to smoky or ferruginous. Head usually of the suffusing tinge, without obvious markings. Collar with a black central line, sometimes with a white line below it; inferior half of collar pale, contrasting in the dark specimens, not differing much in those that run to reddish or luteous. Thorax ranging from rusty red-brown to blackish without markings, except for a diagonal white line which runs from the costal edge of the primaries across the patagia. This is variably distinct, sometimes prominent; but always traceable in good specimens. Primaries with all the maculation obvious, median vein prominently white; costal region gray powdered or with a luteous tinge; a distinct yellowish bar from the end of the claviform to the t. p. line; ordinary spots prominently pale or white-ringed, with usually more or less contrasting centres. Basal line

white, more or less obvious, edged with black scales, outwardly angled on the sub-costal. A blackish shade below median vein at base. T. a. line geminate, defining lines black, included shade white or of the palest ground; inner defining line often obscure or wanting; outer line sometimes wanting, the white included space then alone obvious: in course it is inwardly oblique from the costa to the median vein, then a little outcurved to the submedian, below which it forms a long outward tooth. T. p. line geminate, abruptly bent from costa over the cell, then very even, parallel with the outer margin: the inner defining line is black or blackish, not contrasting, lunulate, broken; outer line blackish, even, broken on the veins, tending to disappear, remaining longest over the costal area; included space pale, sometimes contrasting, sometimes merging into the paler tinting of the s. t. space. S. t. line pale, distinct, very slightly irregular, almost lunulate, in some cases relieved by the darker terminal space and by preceding black spots and dashes in the s. t. space. There is a series of black terminal lunules. Fringes pale, with dusky interlines. Claviform black margined and more or less suffused with black, extending half-way across the median space. The orbicular varies from almost round to an irregular oval, is oblique, white-ringed, the upper margin sometimes cut by the pale subcostal, the centre brown or luteous. Reniform moderate in size, varying from almost lunate to kidney-shaped, pale ringed, the upper and lower edges usually broken by the white vein, centre brown or luteous. The s. t. space on the whole is paler than the median space, and on veins 3 and 4 and 6 and 7 pale rays extend to but rarely even indent the s. t. line. The apex is pale. A dusky shade is on the costa in the s. t. space. The cell is black or blackish around the ordinary spots. Secondaries smoky yellow, darkening to blackish outwardly, the fringes whitish. Beneath gray, ranging to smoky or to yellowish; both wings with a more or less obvious outer smoky shade line; secondaries tending to become darker beyond the dark line, and with a small discal spot.

Expands.—1.12 – 1.36 inches = 28 – 34 mm.

Habitat.—Calgary, Alberta, July 27–August 21 (Mr. Dod); Colorado, July 18 (Mr. Kemp); Brandon, Manitoba (Mr. Hanham).

Five males and seven females in fair or good condition are before me. The species is a variable one, no two specimens at all alike and yet evidently all forms of one species. It resembles *Ridingsiana*, Grt., and

so I had it until Mr. Dod sent me a series for comparison. Compared with the Colorado species this is smaller, darker, less powdery in the female, with rays on the veins even less marked. The oblique white line on the patagia is seen in some examples of *Ridingsiana*, and does not seem to be distinctive. With the males only at hand I should hardly venture to separate this species, though even in this sex there are minor differences that seem constant. In the females the distinction is well marked, that of *maimes* differing little from the male, while in *Ridingsiana* all the examples of that sex are paler, more ashen, dusty gray, with less contrasting maculation.

Hadena (Xylophasia) sora, n. sp.—Ground colour a deep, somewhat rusty red brown. Head may be a little darker. Thorax may be blackish on disk of patagiæ, the central divided crest lighter. Primaries with the maculation all present, but not contrasting. The basal space is a little the lightest part of the wing; next comes the s. t. space from the middle to the inner margin, and then the apex; but the difference is not striking, and is more a mottling with yellowish or gray. The basal line is geminate, of the brown ground colour. T. a. line geminate; the inner line obscure, the outer narrow, blackish, the included space a little paler: as a whole the line is outwardly oblique, a little outcurved in the interspaces, a longer outcurve from the internal vein to the margin. T. p. line lunate or even crenulate, geminate, the outer line more even; as a whole with a moderate outcurve over cell and an even course below. S. t. line pale, irregular, forming a small W on veins 3 and 4; emphasized by a narrow brown preceding shade and by the dark smoky terminal space. There is a series of blackish terminal lunules, beyond which the fringes are cut with luteous. In the basal space there is a slender longitudinal black line, which runs beneath the sub-median vein, and does not quite reach the t. a. line. Claviform small, concolorous, outlined by black scales, pointed, giving rise from the tip to a somewhat diffuse black line, which extends across the cell to the t. p. line. Orbicular narrow, oval, oblique, not well defined, ringed with yellowish, with or without a pale centre. Reniform large, a little constricted, incompletely outlined, the centre a little smoky. Secondaries smoky brown, a little glossy, the fringe more yellowish. Beneath, smoky over a reddish base; both wings with a more or less obvious discal spot and a smoky outer shade line or band.

Expands.—1.64 – 1.84 inches = 41 – 46 mm.

Habitat.—Calgary, Canada, head of Pine Creek, July 2 and 15: Mr. F. H. Wolley Dod.

Two males in good condition. The species is allied to *auranticolor* and *Barnesii*, but is more even than either, and with a more subdued brown colouring.

Xylophasia ferens, n. sp.—Head and thorax smoky brown; head with a pale interantennal line; collar with a black median line over a pale line, the tip pale; the tips of the thoracic tuftings pale. The tibiæ and tarsi are ringed with yellowish. Primaries with all the maculation well written, though not contrasting, the central bar connecting the median lines in the s. t. interspace being the most conspicuous. There is an obscure longitudinal streak, which does not reach the t. a. line at base. Basal line geminate, marked by costal spots only. T. a. line geminate, outwardly bent in the interspaces and a little outwardly oblique. T. p. line geminate, the outer line obscure and partly punctiform, inner line lunulate except in the s. m. interspace. S. t. line pale, broken, a little irregular, forming a small W on veins 3 and 4; apex pale. There is a series of black terminal lunules. The fringes are brown, cut with pale at the ends of the veins. As a whole the terminal space is dark, except at the apex, and the subterminal space is lighter except on costa; a black mark is on the inner margin near base. A broad black bar through the submedian interspace connects the median lines and obscures the claviform. Orbicular small, oblique, outlined by black scales and ringed by white; reniform of moderate size, lunate rather than kidney-shaped; spots paler than the ground, with a central smoky lunule. Between these spots the cell is darker, and the tendency is to form a preceding black spot. There is a sprinkling of olivaceous scales throughout the wing. Secondaries yellowish smoky, darker outwardly, a smoky terminal line, fringes yellowish.

Expands.—1.52 – 1.60 inches = 38 – 40 mm.

Habitat.—Calgary VII., 11 and 12, head of Pine Creek, Alberta.

Two good males from Mr. Dod, who has others. At first sight this species is very like *allecto*; but closer study shows it to be nearer to *runata*, and, as the genitalia make it a *Xylophasia*, its separation from *allecto* is positive. As a *Xylophasia* it is readily distinguished from its allies by the broad wings and clean maculation.

Hadena (Xylophasia) cerivana, Sm.—This is the north-western representative of the eastern *finitima*, which was at one time considered

identical with the European *basilinea*. Recently Dr. Dyar has referred *cerivana* as a variety to the European *basilinea*. A good series, representing all three of the species, being now at hand, I am confirmed in my previous opinions, and present herewith figures of the ♂ genitalia of each. They are drawn to the same scale, with camera lucida and from mounts not under pressure. The differences are not great, but they are absolute, and show our own forms to be more nearly related than either of them is to the European form.

Rancora, Sm.

Since this genus was described in 1894 a number of examples have come to hand that confirm the original generic separation, though in some forms the collar may be as hoodlike as in *Cucullia* and the primaries nearly as lanceolate. A peculiar ornamental feature, which was not considered of importance when only one species was at hand, turns out to be quite characteristic and permanent: it is a rigid black line or bar which extends through the cell on the under side of the secondaries, from the discal spot to the base, and this does not seem to occur in any species of *Cucullia*.

Some of the species described as belonging to *Cucullia* are better referable here, and two new species are at hand.

Cucullia serraticornis, Lintner, belongs to this genus without reasonable doubt, and it is practically certain that *matricaria*, Behr., is the same thing. The type of *matricaria* is a ♂ in the Strecker collection and is a *Rancora* without any doubt. It is a fairly well-marked species and has white secondaries.

Cucullia solidaginis, Behr., also belongs to *Rancora*, and one of the specimens now before me is out of the type lot from the Strecker collection. One ♂ and two ♀ are from Corvallis, Oregon, taken March and April, at light. This is a dull smoky gray form, with narrow pointed wings and a very obvious hood. The maculation is all very obscure and smoky, not a clear black line occurring anywhere on the wing. The secondaries in the female are very deep smoky brown, and in the male they are smoky outwardly, the base dirty white and somewhat translucent.

Strigata, Sm., is the type of the genus, and is more robust than either of the preceding. The thorax is proportionately much heavier, the collar does not form a hood in even the best specimens, and the primaries are decidedly shorter and broader. The colour is a clear, dark ashen or

bluish gray, and the maculation is clearly written and black. Dr. Dyar can hardly have had both these species before him when he wrote *strigata* as a synonym of *solidaginis*. I have three good males under present observation from as many localities in Washington, taken in March and April. The type came from Victoria, British Columbia.

Albicinerea is a very bright gray species, the markings smoky, but clearly defined. The median lines are very much better marked than usual in this genus, and in one example the t. p. line is completely traceable. The secondaries in the male are smoky throughout and only a little paler at base. Three specimens from Alberta and Manitoba are at hand.

Brucei is a sordid ashen gray form in which the transverse maculation is nearly all lost and the black streakings are accompanied by rusty brown stains. The head and thoracic disk are also rusty brown. The secondaries are dull, even, smoky gray. There is only one male, from Garfield County, Colorado, elevation 6,000 feet.

Cucullia albida, Sm., is also a member of this genus, as is proven by a male example now before me. It is distinct from all the others by the whitish primaries, on which the markings are very faintly written. It is almost as much a *Cucullia* in wing form as is *solidaginis*, and, indeed, except for the totally different colour, is a closer ally to it than to any other species in this genus.

In sexual structures the males are very much alike. In all cases there is a rather slender harpe coming to an oblique or acute point, and there is a long, curved, corneous hook as a clasper. The structure is distinctive for each; but the similarity is obvious. In the antennal structure, also, there is no striking difference between the species.

Rancora Brucei, n. sp.—Ground colour a dull, powdery, ashen gray. Front, centre of collar, disk of thorax and dorsal tuftings of the abdomen tinged with rusty; other thoracic parts a little paler gray; powdery. Primaries with the transverse maculation practically obsolete. The t. a. line is barely indicated by a slightly darker tooth in the submedian interspace. There is a short black streak on the inner margin near the base. There is a slender, continuous black line through the submedian interspace from the base to the s. t. space, and this line is a little relieved by accompanying pale scales. There is a distinct black curved streak above the inner angle, and this is margined with rusty brown. Smaller, less conspicuous streaks are in the two following interspaces, and

another prominent black, brown-bordered streak is in the space between veins 4 and 5 ; small, brown-shaded streaks follow to the apex. There is a narrow pale line at the base of the fringes, which are cut with smoky brown. The ordinary spots are indicated by two pale cloudings connected by a very narrow black loop. Secondaries dull, smoky gray, the fringes white at apex. Beneath, powdery gray, primaries darker on disk, with a smoky, discal spot : secondaries more powdery along the costal area, and with the characteristic black line in the cell.

Expands.—1.84 inches = 46 mm.

Habitat.—Garfield County, Colorado, 6,000 feet ; David Bruce.

One good male received some years ago. I had considered this a washed-out *strigata*, and it is quite possible that specimens are in collections under that name. I am pleased to dedicate so good a species to so good a collector.

Rancora albicinerea, n. sp.—Ground colour whitish ash-gray. Head barred and mottled with white and smoky. Collar with a black, transverse line at lower third, below which the colour is smoky, and above which there is a smoky line before and at the tip. Disk of thorax smoky brown or blackish : dorsal tufts of abdomen also brown or black. On the primaries the maculation is clearly traceable. Basal line indicated on the costa only. T. a. line smoky, single, a little diffuse, irregular across the costal space, forms a long tooth in the submedian interspace and a shorter one above the margin. There is a slender black basal line, which enters into the tooth of the t. a. line, but does not cross it. T. p. line forms a geminate smoky mark on costa, is faintly traceable in a wide curve over the cell, becomes conspicuous below vein 2, and extends obliquely inward from vein 1. There is a series of interspaceal black dashes; those between veins 1 and 2 and 4 and 5 the longest ; the lines accompanied by a smoky shading. At the base of the fringes is a series of blackish spots with a gray centre. A median shade is indicated by a curved smoky mark from costa over the reniform. The ordinary spots are very faintly and incompletely indicated by narrow, black or smoky curved marks. Secondaries smoky, a little paler at base, fringes white. Beneath gray, powdery ; secondaries with the usual black mark and bar.

Expands.—1.68 – 1.76 inches = 42 – 44 mm.

Habitat.—Calgary, Alberta, April 24, at sallows, head of Pine Creek, No. 34 (Mr. Dod) ; Rounthwaite and Boucher, Manitoba, end of April.

Three male specimens, of which those from Manitoba came to me

from Dr. Fletcher. All are in good condition and indicate a clear-cut species. On the under side of the cell there is a very dense clothing of long fine hair, which is present in the males of the other species, but is not so well marked. It should be noted that all these species are early fliers, and are on the wing as soon as the season opens. March and April are the dates for such as have any attached.

Explanation of Plate 4.

1. Harpe and clasper of ♂ Acronycta tartarea.
2. " " " " ♂ Noctua Trumani.
3. " " " " ♂ Eueretagrotis inattenta.
4. " " " " ♂ Scopelosoma Colorado.
5. " " " " ♂ Hadena finitima.
6. " " " " ♂ " cerivana.
7. " " " " ♂ " basilinea.
8. " " " " ♂ " runata.
9. " " " " ♂ " ferens.
10. " " " " ♂ " allecto.
11. " " " " ♂ Rancora solidaginis.
12. " " " " ♂ " strigata.
13. " " " " ♂ " albicinerea.
14. " " " " ♂ " albida.
15. " " " " ♂ " Brucei.

Eueretagrotis inattenta and *Scopelosoma Colorado* are not mentioned in this paper, but have been recently described from this same general faunal region.

THE TOMB OF THOMAS SAY.

I have just noticed Prof. Webster's note on the tomb of Thomas Say, and it may be of interest to your readers to know that I have recently visited New Harmony, Ind., and met Mr. John Corbin, the owner of the old Maclure home, where stands the tomb of the father of American descriptive entomology. Mr. Corbin, as Prof. Webster states, is much interested in the proper preservation of this tomb, and is much interested also in the history of Thomas Say. In fact, I found many people in the

little village of New Harmony who knew about Say, and who were distinctly of the opinion that his residence in their village sheds lustre on its history. The village library is an admirable one, housed in a beautiful building, and among the treasures of the library are certain of Say's manuscripts, among others, one written upon the day of his death.—L. O. Howard, Washington, D. C.

NOTE ON THE GENERIC TITLE TRIFURCULA.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

In my "Descent of the Pierids," Jan., 1900, I have used *Trifurcula*, Staud., Iris., VII., 56, for a genus of Andean Pierids, but this name is preoccupied in the Lepidoptera by Zeller, 1848, Staud. & Rebel, Cat. II., p. 221.

Staudinger states (l. c.) that he had at first named the genus *Piercolias*, so this name, though open to criticism, should be used for the Pierid genus with the type *huanaco*, Staud. The morphological value of the neurational character of the primaries of *Piercolias*, which led Staudinger to choose the name *Trifurcula*, does not seem to have been appreciated by him. The gradual progress of R2 towards the apices, and of M2 towards the Radius, brings these branchlets in juxtaposition.

SPINNING METHODS OF TELEA POLYPHEMUS.

In reply to the query suggested by Prof. Grote, in the April number of the Entomologist (page 110), with reference to the spinning methods of Telea, I have discussed the subject with Dr. Fletcher, whose opinion is that only some of the cocoons are so suspended, but recent search has decided me that in this locality this is the case with the majority.

On April 2nd I found two cocoons on a small willow bush, one suspended, with the leaves firmly attached to the stem; the other had been spun between the overhanging sides of a large leaf that had fallen across the limb, thus forming a complete canopy, but the cocoon was firmly fastened to the twig with a lot of silk. Diligent search amongst the leaves on the ground failed to reveal any fallen cocoons. On April 8th I found two cocoons, both suspended on a wild currant bush, and though there was a pile of dry straw lying against the

bush, which would have afforded a splendid harbour for the larva, yet no signs of any cocoon or silk were found on it.

In all cases where I have bred Telea they have attached the leaves and cocoon to the stem with a silken band, which usually entirely surrounds the stem for a distance of over an inch.

I have collected from 2 to 4 dozen of these cocoons each winter for the past three years, and occasionally have found them only very insecurely attached, but in every case where they have been spun amidst a bunch of fallen leaves, they have had the added protection of being fastened to some twig.

Last fall I discovered two cocoons, from which the moths had prematurely emerged, and these were both securely fastened to the end of the twigs.

I shall read with interest all contributions on the subject, as this peculiarity may only apply to western America.

J. Wm. Cockle, Kaslo, B. C.

BOOK NOTICES.

A List of North American Lepidoptera, and Key to the Literature of this Order of Insects.—By Harrison G. Dyar, Ph. D. Bulletin of the United States National Museum, No. 52. Washington, D. C., Government Printing Office, 1902. 1 vol. 8vo.; pp., xix., 723.

Students of Lepidoptera throughout North America have been looking forward with great interest to the publication of Dr. Dyar's List, and have been full of hope that it would afford them an authoritative and final settlement of the nomenclature of our butterflies and moths, which for many years has been in a state of change and instability. We fear that this hope will be seriously disappointed. The changes in many instances appear so arbitrary, the multiplication of genera so inordinate, the absolute extinction of many familiar names so far from necessary, that the ordinary student will feel much hesitation in adopting this List as his guide, and unlearning so much that he has known regarding the names of his specimens. He will naturally be inclined to think that the List cannot be final, and that it will be safer for him to wait for further developments before he changes a large proportion of the labels in his cabinet and fills his notebooks with new names.

Since its publication in 1891, Prof. J. B. Smith's List has been generally adopted, and most collections are labelled in accordance with it. Some changes in generic names have here and there been accepted, and specific names have in various cases been dropped into synonymy, their places being taken by others whose authority has been established. These changes, however, have not been numerous, and their propriety has usually been made evident. In the new List, to take the butterflies alone, we find that Dr. Dyar gives 652 species, and divides them into no less than 158 genera. Dr. Skinner's List, in 1898, gave 645 species and 65 genera, and Prof. Smith's, 640 species and 74 genera. While the number of species has been very slightly increased, the number of genera is more than doubled.

These generic names, set forth by Dr. Dyar, are, for the most part, those of Hubner and Dr. Scudder. Thirty years ago controversy raged over the adoption of Hubner's names and those contained in Dr. Scudder's "Systematic Revision of some of the North American Butterflies." Mr. W. H. Edwards, author of the magnificent work on "The Butterflies of North America," led what may be called the conservative party, while those who favoured the revolution ranged themselves under the banner of Dr. Scudder. In process of time the conflict died out, and many of the names so strongly objected to were adopted by common consent, while others were dropped, even by Dr. Scudder himself in his subsequent grand work on "The Butterflies of the Eastern United States and Canada." In the List before us, Dr. Dyar has not implicitly followed Dr. Scudder's final work, but has made a certain number of changes even from it. He may be abundantly justified by "the laws of priority" in nearly all that he has done—we cannot pretend to have such a knowledge of the literature as would permit us to deny it —but it seems a pity that genera should be split up where structural differences do not require it, merely because Hubner set forth a variety of names more than a century ago.

The list is admirably printed, and provides a most welcome reference to the literature of the subject in the case of every genus and species, but we must complain that no mention is made of the familiar generic names that have been dropped, which surely might have been recorded as synonyms. Such old-established names as Pieris, Colias, Melitæa, Grapta, Pyrameis, Lycæna, Callimorpha, Hydroecia and others have disappeared, and are not even to be found in the very comprehensive

index. This is a great misfortune, as the rising generation of entomologists who accept this book will have nothing by which to connect the new designations with those employed in the older literature.

Time and space will not permit us to discuss the larger field of the Heterocera. Many, no doubt, will be surprised at the arrangement of families, which places the Notodontidæ, Bombycidæ, etc., between the Noctuidæ and Geometridæ. The restoration of the Papilionidæ to the head of the Lepidoptera has been fully justified by Prof. Grote.

The preparation of this list has evidently involved a very large expenditure of time and labour, and we must all acknowledge that the author has placed us under a deep debt of obligation to him. The work, notwithstanding any criticisms that may be passed upon it, is an extremely valuable one, and will be found by its possessors to be most useful, and, indeed, indispensable. Though we may not agree with it on all points, we must admit its excellence and importance, and we beg to congratulate the author on his achievement, and thank him for what he has accomplished. Our hearty thanks are also due to the Smithsonian Institution for its generosity in issuing the work free of charge.

By a strange oversight the CANADIAN ENTOMOLOGIST has been omitted from the periodicals in the list of works quoted, though it is referred to on nearly every page of the book.

ELEMENTARY STUDIES IN INSECT LIFE.—By Samuel J. Hunter, University of Kansas. Crane & Company, publishers, Topeka, Kansas. 1 vol., 8vo., pp. 344. (Price, $1.25.)

We are glad to welcome a book from the West that aims at popularizing the study of Entomology. Prof. Hunter's object is "to induce the student to become acquainted, through personal observations in the field and laboratory, with some of the important biological problems presented by insects." He carries out his plan in a series of well-illustrated chapters dealing with the lives of some typical insects, their special senses and protective devices, those that live solitary or social lives, their instincts and their relations to plants; these are followed by short descriptions of injurious and beneficial insects, and of the principal orders, and some remarks upon their geographical distribution and their struggle for life. The remainder of the book gives instructions for forming a collection, for breeding specimens in order to observe their life-history and for laboratory work for the study of their structure. The volume is profusely illustrated with two plates and over 250 figures, most of which are original and excellent. It will no doubt be found of much service by beginners in the pursuit of Entomology and by teachers who are called upon to give instruction in Nature Study.

Mailed May 2nd, 1903.

Apantesis ornata (male).
" *phyllira*.
" *Nevadensis*,
var. *incorrupta* (male).
" " "
" " (female).
" *celia*.
" *Williamsii*,
var. *determinata* (female).

Apantesis ornata (female).
" *phalerata* (female).
" " "
" " (male).
" " "
" *superba*.
" *Williamsii*,
var. *determinata* (male).

Apantesis ornata,
var. *achaia*.
" *rectilinea*.
" *obliterata*.
" *Queenselii*,
var. *turbans* (male)
" "
" (female).
" (melanic mal

The Canadian Entomologist.

Vol. XXXV. LONDON, JUNE, 1903. No. 6

NOTES ON CANADIAN SPECIES OF THE GENUS *APANTESIS (ARCTIA)*, WITH SPECIAL REFERENCE TO THE LARVÆ.

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(Continued from page 123.)

9. QUENSELII, var. TURBANS.—Probably one of the most interesting surprises we have had since studying these insects, is the fact that the form just mentioned has been taken, and not uncommonly, for some seasons, at several points in Manitoba and the Northwest Territories. The first specimens we examined were collected "at light" at Calgary, by Mr. T. N. Willing. Afterwards Mr. F. H. Wolley-Dod, of Millarville, Alta., forwarded us a beautiful series of nine specimens for study, and Mr. Norman Criddle, of Aweme, Man., also was good enough to send us four examples. Besides these 13, Mr. Willing forwarded seven specimens. While in Washington, in December, 1902, Dr. Fletcher submitted a series of the moths to Dr. Dyar, who compared them with the original description of *turbans*, afterwards expressing himself as certain that our Northwestern form was this variety of *quenselii*.

The 20 specimens before me are fairly uniform, and have a wing expanse of 26–35 mm. None of them show any traces of spots or markings on the secondaries other than those shown in the specimens on the accompanying plate. The markings on the primaries vary chiefly in width, but the three specimens figured give a good idea of the moth. Only one specimen shows any departure, and in this, as will be seen by the photograph, there is a decided tendency to melanism, but only, however, on the primaries. The secondaries of all the males, excepting two, are distinctly yellow, the same colour as *virguncula*, and the marginal markings are remarkably uniform and distinct, with no tendency whatever to melanism. The hind wings of the females are likewise yellow, with the exception of those of two specimens which are orange,

the same as the two males. The moths remind one, somewhat, of *virguncula*, and have been so labelled by some students. They are, however, easily separated from that species, being smaller, and having more white markings on the primaries.

Mr. Wolley-Dod says that the moths are "very common during dry seasons, less so of late years," and that the reddish tinge on the secondaries seems unusual. He also says that the larva feeds chiefly on what he believes to be *Galium*, the imagoes appearing about the end of July and in August. I hope that western collectors will be on the lookout for females of this interesting Arctian, and try to obtain eggs so that we may learn something of its life-history.

Distribution.—Olds, Alta., August 9, 11 (Willing); Sylvan Glade, near Olds, Alta., Aug. 26 (Willing); Calgary, Alta., Aug. 7 (Willing); July 29, 30 (bred), Aug. 3 (bred), 5, 8, 9, 12, 16, 18 (Wolley-Dod); Aweme, Man. (Criddle).

10. OBLITERATA.—While Dr. Dyar was examining the specimens of *quenselii*, var. *turbans*, just referred to, he made the discovery that one of Mr. Wolley-Dod's examples, which we had associated with that form, was the lost species *obliterata*. The noticeable differences between this specimen and the others are, as is shown on the plate, the presence of two additional discal spots on the secondaries, and a dark dash leading to the base of the wing. The colour of the secondaries is orange, the same as in some specimens of *turbans*. It would appear that *obliterata* may be only a variety of *turbans*, but of course further investigation is needed, and I trust the opportunity will come to some one living where *turbans* occurs.

Distribution.—Calgary, Alta., Aug. 15 (Wolley-Dod).

11. BOLANDERI.—A single ♂ collected at Aweme, Man., by Mr. Criddle, has been so named by Dr. Dyar. This Arctian is given in Dr. Dyar's new catalogue as a synonym of *Blakei*, and the specimen in question agrees very well with the figure of *Blakei* on Plate V., Proc. Ent. Soc. Philad., Vol. III. Three ♀ moths received from Mr. Wolley-Dod, and collected at Calgary, Alta., which we cannot exactly place, come very close to Mr. Criddle's specimen, but are larger. Dr. Dyar has published the life-history of *Bolanderi* in the Proceedings of the Boston Society of Natural History, Vol. XXVI., and describes the larva* as "black, dorsal

*Jour. N. Y. Ent. Soc., Vol. VIII., p. 46.

band vermilion red, pale in the incisures; segments white dotted posteriorly; wart iii bright red at base, the subventral warts pale Hair stiff, reddish subventrally." Our Canadian form ought to be bred to see if the larvæ agree with those studied by Dr. Dyar. Doubtless the species will have to be gone over several times before we can get a true knowledge of its variations.

Distribution.—Aweme, Man. (Criddle).

12. NEVADENSIS, var. INCORRUPTA.—This is another Arctian which we did not know occurred in Canada. It also has been found in the West, the only specimens we know of having been collected at Calgary, Alta., and Aweme, Man. The 10 examples we have examined (7 ♂, 3 ♀) are very similar in markings and do not show any variation other than that appearing on the accompanying plate. The moth is an attractive one, the colour of the secondaries of all the specimens being almost a poppy-red, or rose vermilion. The colour of the abdomen above is the same as that of the hind wings, excepting at the tip, where it is a cream colour, as is also the ventral surface, excepting in the 3 ♀ and 1 ♂ which have the under surface of the abdomen black with the posterior edge of each segment ringed with white. A dorsal and a lateral row of black spots occur on all the specimens, and in those which have the segments drawn closely together these appear as wide bands. A single ♀ Arctian (collected June 28) received from Mr. Wolley-Dod, with the primaries marked as in *incorrupta*, had pure black secondaries, as well as a black body. I do not know of anything having been published on the earlier stages of *incorrupta*, and any information on the life-history would be very welcome. Dr. Dyar, in his description of the larva of *superba*, as hereafter mentioned, stated that he thought this to be that of *incorrupta*. This shows that much work is to be done yet before we can acquire definite knowledge. Mr. Coquillett describes the larva of *Nevadensis* as black, with a broken, dull white dorsal line, warts gray, the hairs varying in colour (mixed black and reddish or black and yellowish).

Distribution.—Arcola, Assa., Aug. 20 (Willing); Calgary, Alta., Aug. 7 (Willing); July 7, 30 (bred), Aug. 6 (Wolley-Dod); Aweme, Man., Aug. 1, 5 (Criddle).

13. SUPERBA.—The only examples of this form which we have seen were collected on Vancouver Island. In the "Bulletin of the Natural History Society of British Columbia," 1893, is a list, by Mr. W. H. Danby, of Lepidoptera collected in British Columbia, and in this list *superba* is

noted as "occurring everywhere." Recent collectors, however, report it as scarce. While in New York in December last, Dr. Fletcher compared the specimen figured, with the type of *superba* in the American Museum of Natural History. Dr. Dyar in his list places *superba* as a variety of *Nevadensis*, and in a recent paper* describes the larva as follows: "Head shining black, labrum yellowish, antennæ pale, pinkish at base; width 3.3 mm. Body black, thoracic feet black, the abdominal ones pinkish, pale. Warts large, normal, arctiiform, i. and ii. with shining bases, i. over half as large as ii., which is elongate. Hair abundant, bristly, sparsely barbuled, rather short before, long on joints 12 and 13; most of the hair from wart i. and a few on the sides of ii. are yellow, below this jet-black mixed with white, mostly white from warts iv. to vi. Warts iii. orange, the rest black. A light yellow dorsal line, broken into three spots on each segment, distinct, most of them lanceolate; a line on joints 2 and 3; no shields; joint 2 with little warts, normal. A variety had the dorsal line nearly obsolete, composed of a few dots; wart iii. black like others. Hairs nearly all yellow, only a few black ones mixed; some longer white ones posteriorly." To this description is added "I think, however, that this is the larva of *A. incorrupta*, of which I have only males."

It is to be hoped that British Columbian collectors will endeavor to work out the complete life-history of this interesting form. The moths may be much commoner than we imagine. Many of our western Arctians run very close together, and large series of the moths should be bred from eggs, with the female which laid them correctly associated.

Distribution.—Victoria, B. C., July 9, 11 (Anderson); Hampson gives Fraser R. (St. John) and Vancouver Island as localities for this insect.

14. Williamsii, var. determinata.—Specimens of the typical form of *A. Williamsii*, Dodge, must be very rare. All the specimens we have, and those which have been loaned by correspondents, have proved to be the variety *determinata*. Dr. Fletcher submitted a good series of the moths to Dr. Dyar, who named them all *determinata*. This form is reported as the commonest Arctian in Manitoba and the Northwest. Dr. Fletcher has collected numbers of specimens, and Mr. F. H. Wolley-Dod, of Millarville, Alta., reports that *determinata* is "apparently the most

*Proc. U. S. Nat. Museum, Vol. XXV., 1902, p. 372.

regularly common species of the genus. Have taken it most commonly at light, end June and July, but have seen it flying in sunshine." None of those we have examined agree with Dodge's figure of *Williamsii*, admittedly not correct, in CAN. ENT., Vol. III., p. 167, every specimen having the extra transverse band on the primaries. During the past summer Mr. A. J. Dennis, of Beulah, Man., kindly sent me a batch of eggs of *Williamsii*, var. *determinata;* but, unfortunately, only two of them hatched. These eggs were laid about the 1st July, and hatched on the 9th. The two larvæ reached Stage VI.; one has since died, but the other is now hibernating. The notes on the six stages, presented herewith, are, I believe, the only knowledge we have of the larvæ. In 1885, on May 31, Dr. Fletcher found one larva on *Erigeron filifolius,* Nutt., at Kamloops, B. C., the moth emerging Aug. 1; other larvæ were seen under stones, and at Spence's Bridge, B. C. (June 1), on *Senecio.*

Stage I.—Length at first 1.8 mm., colour dirty whitish, after feeding greenish. Head 0.3 mm. wide, dark, slightly bilobed; mouth-parts reddish. On each segment of body is the usual row of transverse tubercles; these are black and shiny. Cervical shield black. Bristles long and slender, those from tubercles on dorsum black, from the lateral tubercles silvery and longer than the black bristles. Tubercle i. small, ii. very large, iii., iv. and v. nearly same size. Bristles finely barbed. Tubercles ii., iii., iv. and v. are surrounded with brownish-red. Feet concolorous, marked exteriorly with brown. Three days after hatching a pale blue dorsal stripe was discernible.

Stage II.—Length 4.5 mm. Head 0.5 mm. wide, brown, darker at apex, ocelli black. The larvæ in general appearance are brownish, but under a lens the skin from the inside edge of tubercle i. to the lower edge of ii. is seen to be reddish-brown, except at intersegmental folds where it is greenish; with a medio-dorsal stripe of pale blue. The skin between ii. and iii., iii. and iv., iv. and v. and v. and vi. is yellowish, or greenish-yellow, paler subventrally, blotched with reddish-brown. Tubercles black, i. very small, ii. large, iii. and iv. about same size, v. smaller than iv., and vi. smaller than v. Bristles from i., ii. and iii. nearly all black, only a few silvery ones from iv., and from lower tubercles silvery. Bristles faintly barbed, of varying lengths, the silvery ones slender and longest. Spiracles small, black, close in front of tubercle iv. Feet concolorous, semi-translucent, darkened exteriorly.

Stage III.—Length 5.5 mm. Head 0.7 mm. wide, blackish. The two larvæ in this Stage do not show any difference from Stage II. The general colour is the same, as is also the pale blue dorsal stripe, and the yellowish colour of the skin between tubercles ii. and iii., iii. and iv., iv. and v. and v. and vi., shading to greenish subventrally. Tubercles black and shiny; bristles as before, the black ones mostly from i., ii. and iii., and the silvery or slightly rusty bristles from iv. and lower tubercles. Thoracic feet blackish, shiny; prolegs, upper portion blackish, lower portion pale.

Stage IV.—Length 9.5 mm. Head 0.9 mm. wide, black with exception of a pale brownish space on cheek above ocelli. The general appearance of the larvæ in this Stage is darker than in Stage III. The skin of dorsum is mostly blackish, and shades to blackish-gray subventrally. The dorsal stripe is conspicuous, and now almost a cream colour. The yellowish blotches along the sides are still present and the series between ii. and iii. appears almost as a lateral stripe. The tubercles and bristles are as in last Stage. Spiracles small, black, close in front of the lower edge of tubercle iv. Thoracic feet black; prolegs, upper half blackish, lower half paler.

Stage V.—Length 12.5 mm. Head 1.2 mm. wide, black, shiny. Body in general appearance blackish. Skin on dorsum grayish, mottled and blotched with velvety black. Skin on sides yellowish-gray and also blotched with black, but not so heavily marked as on dorsum. Venter much paler than dorsum. Dorsal stripe conspicuous, yellowish, creamy at intersegmental folds. Tubercles black, shiny. Between tubercles ii. and iii. is a distinct lateral band of pale yellow. The whole of tubercle ii. on the inside is margined with pale yellow. The skin between iii. and iv. and iv. and v. is also rather intensely yellow. Spiracles black close in front of iv. Each tubercle has a bunch of barbed bristles, those from i., ii. and iii. being black, while those from iv. and lower tubercles are mostly pale rusty. The dorsal tubercles on segments 12 and 13 bear a few very long slender bristles, which are pale grayish at tips. Thoracic feet shiny, black.

Stage VI.—Length 14 mm. Head 1.6 mm. wide, subquadrate, slightly bilobed, black, excepting just above ocelli, where there is a pale brownish patch with dark mottlings; hairs on face black, of varying lengths; mouth-parts reddish. Body black, shading to grayish-black ventrally. Under a lens, the skin is grayish mottled with velvety black,

especially on the dorsum. Dorsal stripe, orange-yellow, whitish at intersegmental folds. Tubercles as before, i. about one-fifth the size of ii., which has a polished base. The lateral band between ii. and iii. is as before, same colour, but not so bright as the dorsal stripe. The skin between iii. and iv. and iv. and v. is also yellowish, as in last Stage. Bristles from tubercles i., ii. and iii., and mostly from iv., black; only a few pale rusty bristles from iv.; from v. and lower tubercles the bristles are all pale rusty. Thoracic feet black, shiny: prolegs dark, tinged with dull red.

The ♀ moth which laid the eggs has since been received and labelled by Dr. Dyar "*Williamsii*, var. *determinata*." It is shown on the plate herewith, as well as a typical ♂. As this Arctian is so common where it occurs, I trust that our western friends will secure eggs the coming season, so that we may get further light on this interesting species. It seems strange that of all the specimens of *determinata* we have examined (30), only two are females, and these two, if it were not for the additional transverse bar on the primaries, would agree remarkably well with Dodge's figure of *Williamsii*.

Distribution.—Kamloops, B. C., Aug. 1, bred (Fletcher); High River, Alta. (J. Baird); Calgary, Alta., June 21, 23, July 14, 16, 23 (Wolley-Dod); Aug. 7 (Willing); Prince Albert, Sask., July 6 (Fletcher); Alameda, Assa., July 9 (Willing); Carnduff, Assa., July 6 (Willing); Cartwright, Man., June 21, 29, July 3–15 (Heath); Aweme, Man. (Criddle); Beulah, Man., July 1, 6, 15 (Dennis); Elkhorn, Man., July 8 (Fletcher); Ignace, Ont., July 19 (Fletcher); Sudbury, Ont., July 18 (Evans).

15. Phyllira.—As mentioned, this Arctian is thought by some to be the same as *rectilinea*. True *phyllira* has not the veins of the primaries lined, whereas in true *rectilinea* these are conspicuously lined (see plate). The only Canadian specimens I have seen of *phyllira* were collected at London, Ont. We have received other records of the capture of this insect in Ontario, but have not seen the specimens, and these records are included on the authority of the collectors themselves. The species is, I believe, southern in its range. The life-history has been published by Packard, and, as previously mentioned, our larvæ of *rectilinea* answered very well to Packard's description of *phyllira*. Further breeding will have to be done, however, before definite information can be had regarding both these forms, which now have recognized specific names.

Distribution.—London, Ont. (Geo. Anderson); July 6 (A. P. Saunders); Sept. 6 (H. S. Saunders)*; Orillia, Ont., June 28, July 5 (Grant).

16. Celia.—Through the kindness of Dr. Bethune, who has generously presented the original type of *celia* to the Division of Entomology, we are able to figure it on the plate accompanying this article. It will be noticed that the photographs of *celia* and *determinata* ♂ are very much the same, but the moths themselves seem quite distinct, although it is difficult to describe the differences. Five specimens of *celia* are before me, and none of them are anything like *phyllira*, of which *celia* has often been referred to as a synonym. All the five specimens, four of which were submitted to Dr. Dyar, are smaller than the type, and show a decided tendency to melanism. A single egg of *celia* was obtained by Mr. C. H. Young, from a female moth which he collected at Meech Lake, Que. (near Ottawa). This egg, which was laid on May 27 and hatched June 9, he kindly gave to the writer, who reared the larva through six moults. After reaching Stage VII. and feeding for some days it went into hibernation. When examined later, however, it was noticed that a disease had attacked the specimen, so it was killed and inflated. As will be seen from the following notes on the larval stages, our specimen was a fairly large caterpillar, and not at all like the larva of *phyllira* as published by Packard. Saunders's description of the mature larva of *celia* agrees very well with our notes on Stage VII. as given below. Further investigation, however, is needed. The full-grown larva described by Saunders was found under a log in a wood near London, Ont., on June 11.

Stage I.—Length newly-hatched, 2 mm. Colour at first dirty creamy white, after feeding greenish, with a tinge of brown. Head 0.3 mm. wide, shiny; cheeks almost wholly black, just above ocelli pale brownish; clypeus and lower portion of face pale brownish; mouth-parts blackish. On each segment is a transverse row of black tubercles, i. almost half the size of ii., which is the largest, iii. nearly as large as ii., iv. about same size as iii. Cervical shield dark brown, bearing the usual 8 tubercles. Skin of body smooth, shiny. Setæ from dorsal and upper lateral series of tubercles mostly black, only a few silvery bristles; from remaining tubercles, silvery. Bristles finely barbed. Thoracic feet slightly darker than body; prolegs concolorous.

*Can. Ent., Vol. XXI., p. 60.

Stage II.—General colour dull reddish-brown, with a faint pale dorsal stripe, the food showing through front segments giving a greenish appearance to anterior portion of larva. Head 0.5 mm. wide; cheeks black; median suture pale; clypeus, with exception of centre, pale, as is also space above ocelli. Skin of body surrounding tubercle ii. and lateral tubercles, more or less reddish-brown; skin at joints of segments green. Ventral surface green. Tubercles black, shiny. The skin between the two tubercles i. shows up against the reddish-brown surrounding ii., as a faint dorsal stripe. Bristles from dorsal tubercles black; from iv. and lower tubercles pale. On segments 12 and 13 are a few longer black hairs. Spiracles very small, black, close to tubercle iv. All the feet slightly darker than venter.

Stage III.—Length 5.5 mm. Head 0.8 mm. wide, as before. Cervical shield black, shiny. Skin of body much as in last Stage, reddish-brown. Dorsal stripe pale yellow, even, distinct on all segments. Tubercles black, shiny, ii. with a polished base; bristles barbed. Bunches of black bristles, with a few yellowish ones, from tubercles ii. and iii., only a few bristles from i. Lower bristles from iv. pale yellowish or a reddish tinge, from upper half of iv. black; from tubercles below iv. all pale. Skin of body between iii. and iv., iv. and v, and below v., reddish. Ventral surface paler than dorsal. Spiracles small and black. Thoracic feet blackish; prolegs concolorous with venter inside, but blackish outside.

Stage IV.—Length 7 mm. Head 1.0 mm. wide, black, shiny, median suture and space on cheek above ocelli, pale brownish; hairs on face mostly dark. Body dark brownish, mottled and splashed with velvety black. Dorsal stripe reddish-yellow, rather indistinct. The colour of the skin along the sides immediately below tubercles ii., iii., iv. and v. is orange, giving the appearance of series of dashes of that colour. Tubercles as before. Bristles from all the tubercles mostly black; only a few, comparatively speaking, are pale. Spiracles black, almost touching anterior edge of tubercle iv. Feet as before.

Stage V.—Length 12.5 mm. Head 1.4 mm. wide, as in last Stage. Skin of body black, with exception of orange-red dashes above tubercles iii., iv., v. and vi.; these are not conspicuous. Dorsal stripe has almost disappeared, only a faint trace of it now. Tubercles black, shining, ii. with a polished base. Venter not so dark as dorsum. Spiracles black, close in front of tubercle iv. Bristles from tubercles i., ii. and iii. black,

from other tubercles mostly black, with a few pale yellowish-red ones intermingled. Thoracic feet jet-black, shiny; prolegs exteriorly, upper two-thirds black, shiny, lower third reddish. Later in the Stage the skin loses its black intensity, and becomes more of a dark reddish-brown, blotched with gray and black, and the orange-red dashes on sides become more conspicuous.

Stage VI.—Length 18 mm. Head 1.9 mm. wide, black, shiny, epistoma sordid white. Body almost wholly black, no dorsal stripe now. The skin immediately between tubercles iii. and iv., iv. and v. and v. and vi. is now only faintly reddish. Tubercles black, shiny, ii. with a broad polished base. All the bristles from the tubercles are black, with the exception of a few pale reddish ones from tubercles vi., vii. and viii. Spiracles black, touching anterior edge of tubercle iv. Thoracic feet black; prolegs reddish.

Stage VII.—Length 25 mm. Head 2.6 mm. wide, subquadrate, very slightly bilobed, black, shiny; posterior median space of cheek brownish; epistoma whitish; mouth-parts reddish; hairs on face black. Skin of body wholly velvety black. Tubercles black, shiny, large and conspicuous, i. nearly one-quarter the size of ii., ii. with a broad polished base, iii. smaller than ii. Each tubercle above the spiracles has a bunch of black, finely-barbed bristles, of varying lengths. The only rusty bristles are from tubercles v., vi., vii. and viii., and these are a dark rust-red. The dorsal tubercles on segments 12 and 13 bear a few extra long bristles. Spiracles wholly black, touching on abdominal segments the anterior edge of tubercle iv. No markings of any kind on the body. Thoracic feet black, shiny, reddish at tips; prolegs reddish.

When the larva stopped feeding, eight days after the sixth moult, it measured 30 mm. long, and 6 mm. wide at segment 8.

Distribution.—Banff, Alta., June 16 (N. B. Sanson); Aweme, Man. (Criddle); London, Ont., June 30, bred (Saunders); Toronto (Bethune, Croft); Meech Lake, Que., May 26 (Young); Montreal, Que., June 20 (P. M. Dawson); Cowansville, Que. (Fyles).

17. Figurata.—This form has been referred to as a variety of *phyllira*, but Dr. Dyar in his recent catalogue gives it specific rank. The species (if such it is) is rare in Canada. Full notes on the earlier stages would be very welcome. Mr. E. L. Graef briefly describes the mature larva as "jet-black, hairs very stiff." In the Proc. U. S. Nat. Museum,

Vol. XXV., 1902, Dr. Dyar published the following description of the larva of the form *f-pallida:* "Head shining black; epistoma and bases of antennæ pale; width 2.7 mm. Body brown-black, the abdominal feet pale reddish. A broad, distinct, sharp dorsal line, narrowed between warts i., cream-white, pinkish shaded in the incisures. Warts black, hair bristly, sparsely barbuled; i. small, less than one-third the size of ii., i. with small, ii. with large shining base, normal. Hair all black, even the subventral, longer on joints 12 and 13."

Distribution.—Toronto, Ont. (Gibson); Meech Lake, Que., May 31 (Young); Aylmer, Que., June 5 (Young).

18. Nais.—This is a very variable species and one which is constantly being mixed up with *phalerata*. Dr. Seifert has recently published an article on the species in the Journal of the New York Entomological Society, March, 1902, and the plate accompanying his paper gives an excellent idea of the extent of variation in the moths of this Arctian. Through the kindness of Dr. Seifert in sending us eggs, we were able, the past season, to rear a good number of the imagoes. The larvæ also vary considerably and we cannot find any character whereby to distinguish them from the larvæ of *phalerata*.

Distribution.—Springfield-on-Credit, Ont. (Bethune); Kingsville, Ont., Sept. 9 (C. T. Hills); Hamilton, Ont. (Evans); Montreal, Que., July 7 (Stevenson). These records are included on the authority of the collectors themselves. We have not examined the specimens.

19. Vittata.—This species, while it has often been collected, in different localities, cannot be considered a common insect in Canada. The moths are closely related to *nais* and *phalerata*, and a series will show considerable variation. A single specimen was bred at Ottawa in 1900 from a larva collected in a wood on the 26th May. The following description was taken from the cast skin and head: Head black; skin of body velvety black, tubercles black, rough, not polished, each bearing a bunch of bright rust-red bristles, those on the dorsum being slightly darker; none black. Bristles smooth, not barbed; tubercle i. about one-fifth the size of ii. Thoracic feet blackish-brown.

Distribution.—Hamilton, Ont. (Moffat, Evans); St. Catharines, Ont. (Beadle); Toronto, Ont., June (Metcalfe, Gibson); Cobourg, Ont., August (Bethune); Ottawa, bred, June 11 (Gibson); Montreal, Que. (Brainerd).

20. PHALERATA.—The life-history of this Arctian was published by the writer in the CANADIAN ENTOMOLOGIST, Vol. XXXII., p. 369, and in the February (1902) number of the same journal further additional notes were given. On the whole, the moths of *phalerata* are fairly constant. In those which we reared in 1900, there was a remarkable lack of variation; but in some of those bred the following year the W mark on the primaries was indistinct, and in a few (females) nearly obsolete. In none of our specimens, however, is the W mark altogether absent, as is often the case in *nais*. In all the specimens of *nais* which we have reared, the costal edge of the primaries is black, and this character has been referred to in several accounts of that species. In *phalerata*, however, the costal edge of the primaries is yellow in some specimens and black in others, in the same brood. On the accompanying plate two females and two males are figured, one female with a black costa, the other with a yellow costa, and the same with the males. The larvæ of *phalerata* vary chiefly in the colour of the bristles; in most of our specimens these were black dorsally and rust-red subventrally. Some larvæ had bristles of a decidedly pale grayish colour, other specimens had these more of a yellowish tinge, while still other examples had nearly all the bristles of a pale rust-red colour. A dorsal stripe, or a series of elongated spots, was present in some specimens, while others had no markings whatever on the body.

Distribution.—This species doubtless occurs in various districts in eastern Canada, but the only Canadian specimens examined and identified by Dr. Dyar were collected at Toronto, Ont., by the writer.

In conclusion, I beg gratefully to acknowledge much assistance in the preparation of this paper from my kind and ever-helpful teacher, Dr. James Fletcher. The writer is also under much obligation to Dr. Dyar for help, and to his many friends who have sent him material to study and specimens to examine, as well as records of species in their collections. My thanks are also due to Dr. Charles Saunders who took the photograph from which the accompanying plate was made. We shall be very glad indeed at all times to correspond with any one interested in these Arctians, and shall, of course, be most happy to receive for study, eggs or larvæ of any species of the genus. Material of the commonest kind will be gladly welcomed.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

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(Paper No. 14.—Continued from Vol. XXXV., p. 107.)

SUBFAMILY II.—Methocinæ.

1894. Myrmosini, Tribe II. (partim), Fox; Proc. Acad, Sci., Phila., p. 273.

1896. Myrmosini, Tribe II. (partim), Ashmead; Trans. Am. Ent. Soc., XXII., p. 179, 180.

1899. Methocinæ, Tribu 3e (partim) André; Spec. Hym. d'Eur Tom. 8, p. 58 and 71.

1903. Methocinæ, subfamille (partim), André; Wytsman's Gen. Ins. Fam. Mutillidæ, p. 6.

Mr. Ernest André's conception of this subfamily is erroneous; he has placed in it a number of genera that do not belong to the family *Thynnidæ* at all, but are genuine Myrmosids, and represent my tribe *Chyphotini*. Moreover, André has incorrectly classified all of these genera in the family *Mutillidæ*, an error Fox and myself also fell into years ago, before we had studied the *Thynnidæ*.

Mr. Frederick Smith, of the British Museum, was apparently the first to point out that *Methoca* belonged to the *Thynnidæ*, although he still retained it among the *Mutillidæ*. Dr. David Sharp, in Cambridge Natural History, Vol. 5, p. 96, has also correctly placed *Methoca* with the Thynnides and gives a good figure of both sexes of *M. ichneumonides*, Latr.

Table of Genera.

Females ..... 1.

Males ..... 2.

1. Scutellum not differentiated, entirely absent; prothorax and mesothorax finely transversely aciculated; head large, much wider than the thorax, finely sculptured, opaque; eyes large, finely pubescent;

clypeus rounded anteriorly; mandibles large, curved, edentate; maxillary palpi 5-jointed, the lateral palpi 4-jointed (Africa).....Andréus, Ashm.* gen. nov.
(Type A. Abbottii, Ashm.†)

Scutellum differentiated, represented by a convex elevation; thorax and head smooth, shining; eyes bare or nearly; maxillary palpi 6-jointed, the labial palpi 4-jointed.....Methoca, Latreille.
(Type M. ichneumonides, Latr.)

2. Front wings with the first transverse cubitus wanting, the first and second cubital cells confluent.

Clypeus anteriorly produced into a triangular tooth; abdomen long, cylindrical, the hypopygium ending in a single upward-curved aculeus.....Methoca, Latreille.

SUBFAMILY III.—Rhagigasterinæ.

This subfamily ought to be easily distinguished by the characters employed in my table of subfamilies. The genus *Lophocheilus*, Guérin, I know only from the description and figure, and its position is uncertain, although I am inclined to think that it belongs here, and may ultimately prove to be the opposite sex of *Eirone*, Westwood.

Table of Genera.

Females.....1.
Males.....5.

1. Head *without* a sulcus or grooved line on temples behind the eyes (Tribe II., Diammini).....2.

Head quadrate, *with* a sulcus or grooved line on temples behind the eyes (Tribe I., Rhagigasterini).

Claws simple; grooved lines on temples, curved and not quite extending to the eyes; maxillary palpi 6-jointed, labials 4-jointed; first ventral segment simple (North America).....Glyptometopa, Ashmead.
(Type G. Americana, Ashm.)

*Named in honor of Mr. Ernest André

†Andréus Abbottii, sp. n.—Female: Length, 7 mm. Black; antennæ, except the last five or six joints, the mandibles, the palpi and the legs, ferruginous; anterior margin of the clypeus narrowly yellowish-white; abdomen black, polished, shining, the last two segments flavo-testaceous.

Type.—Cat. No. 6812, U. S. N. M.

Hab.—Congo, Africa (Dr. W. L. Abbott).

Claws cleft; grooved line on the temples straight and extending from the eyes to the occiput; maxillary palpi 6-jointed, labials stout, 4-jointed; first ventral segment with a tooth beneath (Australia).... ....Rhagigaster, Guérin.
(Type R. unicolor, Guér., ♂.
= Diamma ephippiger, Guér., ♀.)

2. Claws cleft. .....3.
Claws simple.....4.

3. Head subquadrate, not or scarcely longer than wide; eyes very large; ocelli present; mandibles 3- or 4-dentate: maxillary palpi 6-jointed, labials 4-jointed (Australia).....Diamma, Westwood, 1835.
=Trachypterus, Guér., 1839.
(Type D. bicolor, Westw.)

Head oblong, more than twice longer than wide; eyes minute; ocelli wanting; mandibles at apex bidentate; maxillary and labial palpi both 4-jointed (Australia)..... .....Eirone, Westwood.
(Type E. dispar, Westw.)

4. Head large, oblong, longer than wide; eyes minute; maxillary and labial palpi both 4-jointed (South America).....Aelurus, Klug.
(Type A. nasutus, Klug.)

Head large, subquadrate, a little wider than long, and much wider than the thorax; prothorax ovate; mandibles (?) simple; maxillary palpi 6-jointed (Australia).....Ariphron, Erichson.
(Type A. bicolor, Erich.)

5. Mandibles tridentate.....6.
Mandibles bidentate..... ..... 9.

6 First transverse cubitus *without* an appendage, the first cubital cell undivided .....7.
First transverse cubitus *with* an appendage or spurious nervure, which divides the first cubital cell into two more or less distinct cells....8.

7. Second cubital cell receiving both recurrent nervures; maxillary palpi 6-jointed, labials 4-jointed.....Diamma, Westwood.
Second cubital cell receiving only one recurrent nervure—the first, the second recurrent nervure being interstitial, or nearly, with the second transverse cubitus (Australia)..... ..Oncorhinus, Shuckard.
(Type O. xanthospilus, Shuck.)

8. Third cubital cell *larger* than the second, the second and third each receiving a recurrent nervure; clypeus not prominent, with a slight triangular emargination or impression anteriorly; apical tooth of mandible much longer than the two inner teeth; maxillary palpi 6-jointed, labials 4-jointed (South America) . . Telephoromyia, Guerin. (Type T. rufipes, Guer.)

Third cubital cell *shorter* than the second; clypeus not produced, excised anteriorly; maxillary palpi 6-jointed, joints 1–3 short, 4–6 very long; labial palpi 4-jointed . . . . . Aelurus, Klug.

9. Clypeus somewhat produced, the anterior margin subarcuately emarginated, the labrum more or less exposed, ciliated; maxillary palpi 6-jointed, first joint of flagellum shorter than the second (Australia) . . . . . Lophocheilus, Guérin. (Type L. villosus, Guér.)

THE LARVA AND PUPA OF THE APPLE BUD-BORER (*Steganoptycha pyricolana*, Murt.).

BY E. DWIGHT SANDERSON, AGRICULTURAL COLLEGE, TEXAS.

In studying the larva and pupa of *Steganoptycha pyricolana*, Murt., some observations were made as to structure, which it seems desirable to permanently record. The life-history and habits of the species have been described in the Twelfth Report of the Delaware Agricultural Experiment Station.

"This species was described by Miss M. E. Murtfeldt, in Bulletin No. 23, o. s., Div. Ent., U. S. Dept. Agr., p. 52, as *S. pyricolana*, Riley MS. Concerning the identity, it was stated that 'Professor Fernald, to whom a specimen was shown, considers it identical with Clemens's *S. salicicolana*, which, I believe, breeds in willow galls, but Dr. Riley pronounces it distinct, and he has types of Clemens's species.' My specimens agree entirely with Miss Murtfeldt's description, but are distinctly different from Clemens's types in the collection of the Am. Ent. Society. Correspondence shows that the opinion credited above to Dr. Fernald is incorrect, as he never compared the specimens. Dr. Fernald, to whom specimens were referred, has kindly given the identity of the species considerable attention, and writes me that he has frequently received speci-

mens from various parts of the country, where the larva has been boring in rose. He also states that there is probably no doubt as to my specimens being the same as Riley's *S. pyricolana*.

"Miss Murtfeldt found the larva damaging apple terminals in Missouri in August and September, 1890, and gives an excellent description of the larva and moth. This is the only published reference to the species so far known.

"*Larva*.—5 x 1.25 mm. Elongate, sub-cylindrical; colour from a dirty cream to light yellowish-brown, tinged with pinkish dorsally—usually giving it quite a rose colour, tubercles grayish, spiracles brown; head slightly narrower than prothorax, metathorax to 7th abdominal segment of same width, thence tapering sharply caudad; head shining, front cinnamon brown, sutures darker with blackish line, an indefinite caudo-mesal area slightly darker and a similar darker shade on each dorso-lateral surface caudally, joining on caudal margin under pronotum; labium and maxilla body colour, sutures of under side of head dark, palpi and antennæ light, latero-ventral sutures of head black, ocelli black, forming a short black bar extending caudo-dorsad back of antennæ, labrum dark brown; abdominal segments with two and thoracic with three annulæ; pronotum chitinous, straight, cephalic margin covering caudal part of head which is visible beneath, caudal margin curved, surface shining; legs with basal suture in front dark, otherwise concolorous; tips of prolegs dark brown; the 8th abdominal segment, especially on the caudal annulet, giving it a darker, olive colour, the 9th abdominal targite chitinous, shiny, olive colour; caudal setæ prominent, long as the ninth segment; anal prolegs cylindrical, reaching to the tip of the ninth segment, brown at tips; four or five stiff brown setæ above anus; segments of abdomen rather longer caudally."

Larval Mouth-parts.—The under side of the larval head is shown in figure 4. I have been unable to homologize the sclerites at the base of the labium and maxillæ; *ca* is evidently the cardo of the maxilla, in two parts; *c* may also be a part of the cardo; *a* and *b* may form one sclerite, though there is a distinct suture between them; *d* forms a band connecting *h* on either side (this same sclerite is found in Coleopterous larvæ, and seems to be the ventral sclerite of a head segment); *e* is membranous, and in it lie chitinized sclerites *g* and *f*. From *g* the occiput (?) *i* runs dorsad, the portion *i* of the figure being the break caused by the detachment of *i* from *j* on the slide; *j* is distinct from *h*, and caudally there is a distinct suture

at *x*, separating it from the dorsal portion of the head. The dotted line extending in front of the ocelli is hypothetical, but traces of it can occasionally be distinguished in other larvæ, and the separation of these two ocelli from the others indicates it. The long band with enlarged ends, marked *k*, lies within the head above the maxilla and is strongly chitinized.

I call attention to these different parts for the purpose of pointing out the necessity for the study of the sclerites of the larval head. I have consulted several specialists of Lepidopterous larvæ without securing any information as to the identity of these parts. I have found the same difficulty in Coleopterous larvæ. Certainly these parts possess more or less taxonomic value, and it seems to the writer that we err if we fail to delineate and describe them in the description of larvæ. But as long as we have no terminology, this is difficult and will probably be neglected by most students. Studies are certainly needed along this line.

Pupa.—Described from cast skins and one specimen nearly ready to transform.

5.5 x 1.3 mm.; deep orange brown ; head, thorax and exposed portions of appendages blackish ; spines on abdominal segments tipped with black ; setæ light ; thorax and first abdominal segment without dorsal spines ; second abdominal segment with caudal row of spines ; third to seventh abdominal segments with spines, as in Fig. 5 : eighth to tenth, as in the figure ; segments one to six subequal in length ; seventh shorter ; eighth to tenth, adnate ; eighth and ninth together as long as sixth, tapering caudad from fourth segment. In the figure *x* marks a break between *a* and *b* in the cast skin from which drawn. Concerning the identity of sclerites *a* and *b*, I am in doubt.

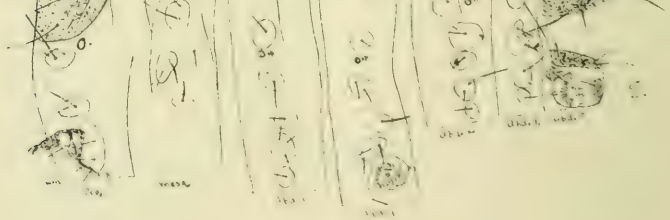


Fig. 2.

Fig. 3.

Explanation of Figures.

Fig. 2.—Tubercles of larva of *Steganoptycha pyricolana* diagrammed; *d. m.*, dorso-meson; *v. m.*, ventro-meson; *pro*, *meso*, pro and meso-thorax; *abd. 1-10*, abdominal segments, 1 to 10; *sp.*, spiracle.

Fig. 3.—Larval mouth-parts of *Steganoptycha pyricolana*: *l*, labrum; *m*, mandible; *a*, antenna; *h*, dorsal aspect head; *t*, tarsus; all enlarged.

Fig. 4.—Ventral aspect of head of larva of *Steganoptycha pyricolana*, enlarged; for discussion of parts, see text.

Fig. 5.—Pupa of *Steganoptycha pyricolana; a*, dorsal aspect 4th abdominal segment; *b*, dorsal aspect 8–10th abdominal segments.

Fig. 4.

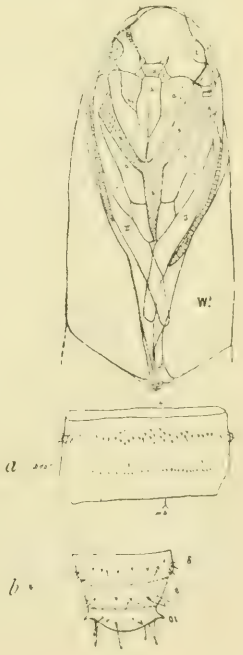


Fig. 5.

NEW BEES OF THE GENUS ANDRENA.

BY S. GRAENICHER, MILWAUKEE, WIS.

Andrena thaspii, n.sp. ♀.—Length 10–11 mm.; black, clothed with light ochraceous pubescence; head broader than thorax; facial quadrangle broader than long; cheeks broad, shining, with fine punctures, which are very close immediately behind the eyes; front below ocelli distinctly striate; facial foveæ broad, containing light pubescence; antennæ long and slender, black; flagellum brownish testaceous beneath, especially towards the tip; joint 3 of the antennæ as long as 4 and 5 together; clypeus shining, clothed with thin, light pubescence; a distinct impunctate line in the middle, otherwise with moderately coarse punctures; basal process of labrum truncate; mandibles dull testaceous at the tips; mesothorax slightly shining, and covered with short, thin pubescence; on the scutellum the hairs are rather long and dense; the punctures of the mesonotum are shallow and not close together; wings yellowish hyaline, hardly clouded at the apex, with honey-coloured nervures and stigma; second submarginal cell slightly narrowed above, about half as long as the third, receiving the first recurrent nervure beyond the middle of the cell; metathoracic enclosure defined by an impressed line, its surface more finely sculptured than the surrounding area of the metathorax, except at the base, where it is slightly rugose; legs dark brown; tibial scopa bright fulvous, shining; the basal joints of the middle and hind tarsi are covered with ferruginous pubescence on their inner surface; abdomen shining, with sparse light hairs which are long on the first segment, but otherwise very short, forming thin apical fasciæ on segments 2 to 4; anal fimbria dark fulvous, inclining to ferruginous.

♂.—Length 9 mm., pubescence of head and thorax longer than in female; clypeus more closely punctured throughout; joint 3 of antennæ longer than 5, but distinctly shorter than 4+5; metathoracic enclosure with the longitudinal rugæ extending throughout its whole length; joints 2 to 5 of anterior and middle tarsi, and all the joints of posterior tarsi, ferruginous.

Milwaukee, Wis.; 5 ♂ and 9 ♀ specimens captured on the flowers of *Thaspium trifoliatum aureum*, and *Angelica atropurpurea*, between May 29 and June 23. The females obtain their pollen mostly from the flowers of the first-named plant.

Andrena Cockerelli, n. sp. ♀.—Length 10–11 mm.; black, with long, thin, whitish pubescence; a few black hairs on front below ocelli; facial foveæ broad, black, reaching a little below the insertion of the antennæ; antennæ dark, joint 3 longer than 4 and 5 together; clypeus convex, somewhat shining, distinctly roughened and closely punctured; a median narrow and slightly elevated impunctate line; process of labrum triangular, notched at tip; mandibles black, slightly ferruginous near the tips; cheeks broad and evenly rounded, finely roughened, clothed with long, white pubescence; mesonotum dull, tessellate, with sparse, hardly visible, punctures; the disc of the mesonotum is somewhat shining, as also the scutellum; enclosure of metathorax small, bordered by an impressed line and somewhat rugose at base; wings hyaline, nervures and stigma testaceous; the second submarginal cell is about two-thirds as long as the third and receives the first recurrent nervure far beyond the middle of the cell; abdomen shining, minutely granular, without punctures; the thin white pubescence of the abdomen is most conspicuous on the first segment; legs dark brown, with white pubescence; the basal joints of the tarsi are clothed with fuscous hairs on their inner surface; anal fimbria dark purplish brown.

♂.—Length 9 mm.; the pubescence is of a purer white than in the female; in addition to the black hairs below the ocelli, there is a narrow row of black pubescence immediately behind and in front of the eye; there is also a patch of black hairs on the sides of the metathorax; head large, broader than the thorax; antennæ long, slender, joint 3 hardly as long as 4 + 5; the surface of the clypeus is concealed by long and dense pubescence; mandibles long and slender; cheeks broad, produced into a rounded angle, which is situated above the middle of the eye.

Milwaukee, Wis.; numerous ♂ and ♀ specimens from April 6 to 30, on flowers of willows, especially of *Salix discolor*. Kent Co., Mich.; 1 ♂, April 1, 1902 (collected by A. D. Macgillivray, received from Prof. T. D. A. Cockerell). Hartford, Conn.; 1 ♀, April 19, 1896 (collected by S. N. Dunning, No. 1011, received from Prof. T. D. A. Cockerell).

The females are all about the same length. The males vary considerably in size, ranging from 6 to 9 mm. in length. This species resembles *A. macoupinensis*, Rob., but differs from it mainly in the following characters: Facial foveæ distinctly black (pale in *macoupinensis*); legs dark brown (hind tibiæ and tarsi ferruginous in *macoupinensis*);

anal fimbria dark purplish-brown (ochraceous in *macoupinensis*). It is also very close to *A. perarmata*, Ckll., a species with black facial foveæ. In this respect Prof. Cockerell, to whom several of my specimens were submitted, writes as follows: "Your ♀ differs from ♀ *perarmata* by lacking the black hair on metathorax. Also, type *perarmata* has the process of labrum more pointed than in your insect." The ♂ of *Cockerelli* may be readily distinguished from that of *perarmata* by the absence of a tooth at the base of the mandibles.

Andrena Milwaukeensis, n. sp. ♀.—Length 11 mm.; black, with bright fulvous, erect, stiff hairs on vertex, thorax above, and first two segments of abdomen above, otherwise the pubescence is black; vertex minutely granular; cheeks rounded, with thin, black pubescence, which does not conceal the sparse shallow punctures; front finely striate; facial foveæ broad, appearing dark chocolate brown when viewed from above; antennæ slender, brownish, dull ferruginous beneath towards the tip; joint 3 of flagellum hardly longer than 4 and 5 together; a patch of light hair about the insertion of the antennæ; clypeus smooth, shining, covered with short, thin, black pubescence; on the sides of the clypeus the punctures are small and crowded, towards the middle they become coarse and rather sparse; a median impunctate and polished area, widening gradually below; process of labrum shining, truncate, emarginate; mandibles black with a ferruginous area near the tips; the mesonotum and scutellum are opaque, granular, not punctured, thickly covered with fulvous pubescence; tegulæ testaceous; wings fibro-hyaline, stigma testaceous, nervures dark brown; second submarginal cell somewhat narrowed above; the first recurrent nervure joins the latter near the second transverse cubital nervure; third submarginal cell more than twice as long as second; enclosure of metathorax distinctly outlined by a smooth impressed line, with small rugæ at its base; legs black, with black hairs, becoming dark brown on the front tibiæ; abdomen tessellate, without punctures, black, shining, with slight metallic reflections; segments 2 to 4 are depressed about one-third apically; there is a patch of fibrous pubescence on segments 1 and 2, covering segment 1 almost entirely, and becoming narrow towards the apex of segment 2; otherwise the segments are clothed with short, stiff black hairs, not forming apical fasciæ; anal fimbria black.

♂.—Length 9 mm.; differs from the female as follows: Pubescence longer, but thinner, entirely fulvous, without a trace of black hairs; head

extremely broad ; clypeus with small punctures throughout, except a median impunctate and very narrow line ; mandibles very long and slender, strongly curved, with tips entirely ferruginous ; joint 3 of the very long antennæ shorter than 4 + 5 ; cheeks considerably produced, forming a rounded angle above the middle of the eye ; sixth and seventh abdominal segments with thin fulvous pubescence.

Milwaukee, Wis.; 4 ♂, 13 ♀ specimens taken between May 4 and June 23, on various flowers. The colour of the pubescence varies from light ochraceous to bright fulvous in the female. One of my male specimens has only 2 submarginal cells on each side. This species resembles *A. Hallii*, Dunning, but the latter is a larger insect, and differs otherwise from *A. Milwaukeensis*. In some of the females the patch of fulvous pubescence on the abdomen extends even to the tip of the third segment. This patch of light ochraceous or bright fulvous pubescence on the first 2 or 3 abdominal segments separates this species from *A. Hallii*, as also from any of the species of *Andrena* flying in this locality.

Andrena viburnella, n. sp. ♀.—Length 11 mm.; body robust, black ; head, thorax and legs with very light ochraceous pubescence ; vertex distinctly roughened, not punctured ; cheeks tessellate, finely and closely punctured ; the thin pubescence is slightly longer on the lower portion of the cheeks than on the face ; front coarsely striate, with a median ridge extending from the ocellus to the base of the antennæ ; the upper one-third of this ridge is low, but the remaining part is very prominent ; facial quadrangle broader than long ; antennæ stout, dark brown, with testaceous tips ; joint 3 about equaling joints 4 + 5, certainly not longer ; facial foveæ broad, with dark reddish-brown pubescence ; clypeus shining, clothed with short hairs ; the punctures of the clypeus are close and moderately coarse ; a median impunctate stripe is visible ; process of labrum long, truncate ; mandibles black, ferruginous on their apical halves, notched within near the tips ; mesonotum thickly covered with short, stiff hairs, its surface is dull, tessellate, with close, shallow punctures ; scutellum shining, somewhat swollen, with a median impression ; its punctures are closer and more distinct than those of the mesonotum ; tegulæ piceous ; wings dusky, nervures and stigma ferruginous ; second submarginal cell not as broad as third, receiving the first recurrent nervure at the middle ; metathorax coarsely roughened, its enclosure defined by a faint impressed line ; the enclosure is somewhat

rugose at base, otherwise finely sculptured; legs dark brown, the small tarsal joints ferruginous; tibial scopa shining, of a lighter colour than the pubescence of the body in general; abdomen shining, bare, without hair-bands; segments 2 to 4 closely and finely punctured, depressed about one-third apically; the depressions are tessellate, and contain only a few scattered punctures; anal fimbria dark fulvous.

Milwaukee, Wis.; 2 ♀ specimens, May 29, 1902, from the flowers of *Viburnum lentago*. In the type specimen the legs are dark brown; in the second specimen the legs are inclined to ferruginous.

Andrena albofoveata, n. sp. ♀.—Length 9 mm.; black; pubescence whitish, more or less yellowish on mesonotum; facial quadrangle broader than long; head with short, sparse pubescence; cheeks finely roughened, with very small punctures; front striato-punctate; facial foveæ very broad above, narrowing gradually below and not unusually separated from eye; the pubescence of the foveæ is silvery-white, appressed; antennæ robust, black, somewhat testaceous beneath; joint 5 shorter than 4, both together longer than 3; clypeus nearly bare, shining, with close and coarse punctures, and an elevated impunctate line; process of labrum small, shining, lightly truncate; thorax with short, thin, erect pubescence; mesonotum hardly shining, with fine punctures, which are close on the sides, but sparse on the disc; median and parapsidal grooves present, the latter very distinct; scutellum shining and more coarsely punctured than the mesonotum; tegulæ piceous, a testaceous spot exteriorly; wings yellowish-hyaline with rufo-testaceous nervures and stigma; second submarginal cell about one-third as long as the third, and receiving the first recurrent nervure near the second transverse cubital nervure; enclosure of metathorax with longitudinal rugæ, bordered by a low transverse ridge; legs very dark brown, covered with griseous hairs; on the inner surface of the basal joints of the tarsi the pubescence is yellowish; segments of abdomen depressed about one-third apically, closely and finely punctured throughout; there are thin apical fasciæ of whitish pubescence, which are interrupted in the middle on segments 2 and 3; anal fimbria light fulvous, sparse.

Milwaukee, Wis.; 7 ♀ specimens, June 15 and 16, 1902, on flowers of *Angelica atropurpurea*. This species belongs to the genus *Trachandrena*, Rob. It is rather variable; in some of the specimens the pubescence is light ochraceous, and the hind tibiæ and tarsi are ferruginous.

SOME APHIDIDÆ OF THE GENUS NECTAROPHORA FROM NEW MEXICO.

BY T. D. A COCKERELL, EAST LAS VEGAS, N. M.

Nectarophora rudbeckiæ (Fitch).

Hab.—Beulah, N. M., alt. 8,000 ft., very abundant on *Rudbeckia ampla*, A. Nelson. It is preyed upon by *Hippodamia convergens*. This species is easily known by its bright scarlet colour. Monell reports *N. rudbeckia* from many genera of Compositæ at St. Louis, Mo.; in New Mexico I have found it only on one species of *Rudbeckia*; even the species on *Rudbeckia hirta* is quite different.

Nectarophora solidaginis (Fabr.).

Hab.—Beulah, N. M., July 26, numerous on *Solidago*. Blackish-red, some almost black; nectaries black; cauda light yellowish; stigma pale greenish (yellowish in *N. rudbeckiæ*); femora with basal two-thirds pale yellowish, distal third blackish. The very young may be slightly tuberculate dorsally. Many of the young are bright red. In the winged female the cauda is just half the length of the nectaries; the latter are imbricated.

This species is very near to *N. rudbeckiæ*, but evidently distinct. It agrees with Buckton's account of European *N. solidaginis* in all essential particulars; Buckton's description and figure indicate a black cauda, but in his table on p. 102 he says it is yellow. The species is new to America, but is evidently native; a member of the circumpolar fauna.

Nectarophora corallorhizæ, sp. n.

Hab.— Beulah, N. M., July, 1902 (*W. P. Cockerell*). Numerous on *Corallorhiza multiflora*.

Apterous ♀.—Green (pale yellow mounted in balsam), without markings; length 2½ to nearly 3 mm.; eyes scarlet; cauda pallid; nectaries very long, colourless at base, blackish in middle, paler beyond, but blackish again at the extreme tip; antennæ pale, dusky at ends and at the joints; legs pale, apical portion of femora dusky; tarsi black or nearly so. Antennæ over 3 mm.; cauda ensiform, about 630 μ; nectaries 1400 μ; antennal joints measuring in μ; (1.) prox. 150, (2) 100, (3.) 1130, (4.) 920, (5.), 730, (6a.) 150, (6b.) 1020.

Nectaries slender, often curved outwards towards the end. Sensoria few, on under side of basal half of third joint.

N. lutea, Buckton, found on greenhouse orchids, is yellow, with a large dorsal dark brown spot, and has much shorter nectaries. *N.*

urticæ, Kalt., seems to resemble our insect as much as anything, but it is not the same.

Nectarophora agrimoniella, sp. n.

Hab.—Beulah, N. M., July 27, 1902 (*W. P.* and *T. D. A. Cockerell*). Very abundant on *Agrimonia eupatoria*, Auctt., inhabiting the flower-stalks.

Winged ♀ (full of young)—Large, light apple green (orange-ferruginous mounted in balsam), without markings; eyes black; femora with basal two-thirds light green, distal third black, or sometimes less (about 90 μ); distal 90 μ of tibiæ, and all of tarsi, black; nectaries suffused with blackish; antennæ dusky, joint 3 black except the basal 30 μ; third antennal joint with very numerous (about 32) protuberant sensoria, about equally distributed on the proximal and distal halves; cauda tapering, with a blunt tip, sides with bristles set on little prominences; no capitate hairs anywhere.

Length of body about 3 mm., wings about 3½ mm.; other measurements in μ:—Antennal joints: (1.) 120, (2.) 110, (3.) 1100, (4.) 900, (5.) 730, (6a.) 160, (6b.) 1230. Cauda about 450; nectaries 1000, with imbricated surface; beak 700 to 750; anterior femur 1000; marginal cell with substigmatic portion 380, and poststigmatic portion 660.

Allied to *N. erigeronensis* (Thos.), which it resembles in the numerous sensoria on joint 3.

Nectarophora rudbeckiarum, sp. n.

Hab.—Beulah, N. M., July 26, 1902, on *Rudbeckia ampla*. with *N. rudbeckiæ*, but not nearly so numerous.

Winged ♀.—Light green; eyes, ends of tibiæ, and tarsi, black. Length of body about 2¼ mm., of wings about 4½ mm. Measurements in μ: Nectaries 1200; cauda about 600, breadth at base 120, in middle 170; beak about 750; anterior femur 1500; antennal joints, (3.) 1200, (4.) 1250, (5.) 1070; marginal cell with substigmatal portion 420, poststigmatal 500. *Apterous* ♀ about 4 mm. long, including cauda. This cannot be a green variety of *N. rudbeckiæ*, for the following reasons:

(1.) *N. rudbeckiæ* has much shorter nectaries, not over 850 μ.

(2.) *N. rudbeckiæ* has a longer marginal cell, with substigmatal portion 550, poststigmatal 700 μ.

N. rudbeckiarum differs as follows from *N. agrimoniella:*

(1.) The third antennal joint is not nearly so dark, and has only about ten hardly protuberant sensoria, which are practically confined to the basal half of the joint.

(2.) The cauda, which in *agrimoniella* tapers from the base to the apex, in *rudbeckiarum* is spear-head shaped, with the base narrower than the middle. These descriptions represent the cauda as seen from above.

(3.) The apical portion of the stigma is narrower and more produced than in *agrimoniella*.

(4.) The femora are not at all black at distal end.

(5.) The nectaries are green. This character distinguishes the species from *N. erigeronensis*.

N. rudbeckiarum turns orange-ferruginous mounted in balsam; darker than *N. agrimoniella*.

Nectarophora heleniella, sp. n.

Hab.—Beulah, N. M., July 26, on flower-heads of *Helenium hoopesii*, Gray. Not numerous.

Winged ♀.—Apple green, smaller and deeper coloured than *N. rudbeckiarum;* length of body about 2 mm., wings about 3⅓. Eyes black; nectaries only slightly dusky; femora greenish, only moderately suffused with blackish apically; antennæ black, except short basal joints and extreme base of third joint; third joint with nine large and four small sensoria, the last one 45 μ from base of joint. Measurements in μ: Nectaries 710; cauda about 300, tapering from base to apex, in the manner of *N. agrimoniella;* beak about 600; anterior femur 920; antennal joints, (3.) 770, (4.) 660; (5.) 530, (6a.) 140, (6b.) 1140. Marginal cell with substigmatal portion 320, poststigmatal 500.

The apterous form (immature) has the cauda short and broad, broad-pyramidal in outline seen from above. The immature form is slightly pruinose, and has a darker green dorsal band.

Allied to *N. geranii*, but distinct.

Nectarophora Martini, sp. n.

Hab.—Beulah, N. M., 1902, on many plants. Named after my son Martin, who used to help me collect insects at Beulah. The form on *Helenium* may be taken as the type. Similar to *N. sonchi* (L.), of which *N. ambrosiæ* (Thos.) is the American representative, if not a synonym, but differs especially in the young, which are pruinose and do not share the piliferous tubercles. It is also allied to *N. sonchella*, Monell, but the fourth antennal joint is not tubercular, and to *N. calendulæ*, Monell, but that has the third joint very slightly tubercular. The two last-mentioned are also not pruinose when young, so far as I can learn; herein they will agree with *N. solidaginis*, which is easily known from *N. Martini* by the much redder, non-pruinose, young, as well as the shorter nectaries of the winged female.

I assume that the insects collected on different plants are the same species, because I am unable to find any tangible characters to separate them ; but I give my notes on each lot separately :

(1.) On *Rudbeckia hirta*, Aug. 4. Winged form dark reddish to practically black ; nectaries black, cauda pale yellowish ; femora with apical half black, basal half pale ; stigma pale greenish. Apterous form shiny, 3 mm. long, not counting cauda.

Winged ♀.—Cauda ensiform, with large lateral bristles ; length about 500 μ. Nectaries about 1000 μ long, black. Eyes black. Antennal joints in μ, (3.) 1070, (4.) 980, (5.) 850, (6a.) 200, (6b.) 1300. Stigma tapering, marginal cell with poststigmatal part considerably longer than substigmatal. Antennæ black, joint 3 with prominent sensoria (at least 40) along its whole length except extreme ends. Joint 4 without sensoria. The other lots enumerated below showed the same microscopical characters except some little difference in size, and a smaller number of sensoria on joint 3 in the material from *Potentilla* and *Frasera*.

(2.) On heads of *Helenium hoopesii*, July 26. Young and apterous adults. The young are reddish, with greenish legs, and have a decided bluish pruinose bloom. They are not tuberculate. The apterous adults are shiny dark wine-red, with the legs as in *N. rudbeckiæ ;* i.e., basal two-thirds of femora pale ochreous, apical third, and tibæ and tarsi, black or blackish. Nectaries long, black, obviously longer than in *rudbeckiæ*. The bluish bloom is conspicuous even in subadults. On Aug. 3 the species was found in great abundance, winged specimens being present. The green species (*N. heleniella*) was present in smaller numbers ; it cannot be a colour-variety of *N. Martini*, owing to the great difference in the sensoria on the third antennal joint. Measurements in μ:—Apterous ♀ : nectaries 1330 ; antennal joints, (2.) 120, (3.) 1100, (4.) 900, (5.) 735, (6a.) 150, (6b.) 1030. Winged ♀ : nectaries 820 ; antennal joints, (3.) 930, (4.) 790, (5.) 710, (6a.) 180, (6b.) 1090.

(3.) On *Frasera speciosa*, Auctt., abundant. Winged ♀ : dark wine-red ; stigma yellowish ; legs black, basal ⅔ of femora and coxæ, pale greenish ; nectaries black, yellow at extreme base ; cauda reddish. Immature forms pruinose. Measurements in μ —Winged ♀ : nectaries 1000 ; antennal joints, (1.) 160, (2.) 100, (3.) 960, (4.) 810, (5.) 720, (6a.) 170, (6b.) 1000.

(4.) On flower-heads of *Zygadenus Nuttallii*, Coult. Flora, abundant July 31. Winged ♀ : Head and thorax reddish-brown, abdomen darker; nectaries black, pale at extreme base : femora very pale greenish, black at apex ; young pruinose.

(5.) On *Eriogonum* (a tall species with greenish-yellow flowers), July 29, a few only. Winged ♀: Shining very dark plum colour; abdomen same colour as head and thorax; legs black, basal half or less of femora, and coxæ, pale ochreous; nectaries black; cauda and stigma ochreous yellow; antennæ black; wings strongly iridescent. Young pruinose, with olive-slate legs, antennæ and nectaries. The nectaries are obviously shorter than in the *Potentilla* form, and are held erect. Apterous ♀: 2⅓ mm. long. Measurements in μ: nectaries 810; antennal joints, (1.) 150, (2.) 100, (3.) 920, (4.) 770, (5.) 650, (6a.) 185, (6b.) 680.

(6.) On *Ligusticum* (species with yellow flowers), July 29; not many. Winged ♀: Dark brown; nectaries black; legs black, basal half of femora, coxæ and basal half of tibiæ more or less, yellowish. Measurements in μ: nectaries 840; antennal joints, (1.) prox. 150, (2.) 100, (3.) 880, (4.) 730, (5.) 710, (6a.) 200, (6b.) 1220. The *Ligusticum* grew mixed with the *Potentilla* next mentioned.

(7.) On *Potentilla* (apparently *P. pulcherrima*), July 29, first found by my wife; very abundant. Dark reddish-gray, winged form with the head and thorax more decidedly red, contrasting with the darker abdomen. Half-grown more or less pruinose, with legs, antennæ and nectaries dark olive. In the winged form these parts are black or blackish, with the basal two-thirds of femora light yellowish. Stigma light yellowish. Nectaries over twice length of cauda, which is pink. Measurements of winged ♀ in μ: nectaries 990; antennal joints, (1.) prox. 150, (2.) 100, (3.) 980, (4.) 950.

The specimens on the *Potentilla* have the nectaries a trifle shorter than those on *Frasera* and *Zygadenus*, but otherwise appear just the same. Curiously, however, the *Potentilla* form when disturbed jerks to and fro, but will not drop to the ground; while those on *Frasera* and *Zygadenus* do not jerk nearly so readily, neither do they fall. This difference in the reaction of the creature to irritation was repeatedly observed, and suggested that the species were different, but I am quite unable to find satisfactory morphological characters to separate them. Monell has remarked that *N. sonchella* always drops to the ground when disturbed.

Nectarophora, spp.

Other species of *Nectarophora* were taken at Beulah on *Sophia incisa*, *Geum*, *Gnaphalium decurrens*, *Phacelia circinata*, *Erigeron* and *Populus angustifolia*, but I did not secure the winged females and so have deferred their description.

SYNOPSIS OF NOMADINÆ.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

This paper is intended to give the results of the study of the local species.

Unless otherwise indicated, vein a = basal nervure; vein V_2 = transverse medial nervure; vein *rm* = first cubital nervure; cell III_{1-2} = marginal cell; cell III_5 = second cubital cell; "joint" refers to antennæ; "segment" refers to abdomen.

There has been enough confusion in this group to suit the most stupid of lumpers. It takes a mystagogue to identify a species from a description of its ornaments. Such descriptions are regular pitfalls—regular synonym-traps. The description of *N. bisignata*, Say, can be duplicated from five different local species. Mrs. Annie Trumbull Slosson sent me specimens of the immaculate form of *Gnathias ovatus*, which had been identified for her as *N. incerta*. The former has bidentate mandibles and simple coxæ, while the latter has simple mandibles and spined coxæ, and is the female of *Centrias americanus*. The synonymy is given in Tr. Am. Ent. Soc., *22*: 125. Here the question arises as to whether the *N. americana*, Kby., is the same as *N. incerta* or the same as this immaculate form of *G. ovatus*. The latter is rare, and has the abdomen much paler than indicated in Kirby's description of the former. Then, which one of these is the immaculate variety of Say's *N. bisignata*? Here, also, *N. incerta* is by far the more probable determination. *N. simplex*, with simple mandibles, was identified as *N. bella*. On comparing the type, I found that *N. bella* had bidentate mandibles.

N. affabilis, Cr., is composite. The N. Y. specimen, on which the description was evidently based, is regarded as the type. The Ill. specimen is the male of *N. vincta*. The ornaments of the two species are almost identical.

N. rubicunda, Oliv., (= *N. torrida*, Sm.) belongs to *Centrias*.

N. bella and *maculata* belong to *Gnathias*. I have examined the types of the former twice, and of the latter once. They resemble *G. cuneatus*, but are quite different from the local specimens. *N. maculata* is much larger and more red. At present I would not unite them. The two local species are very common and very variable. In the table I have indicated the colour forms at some length. They seem to show a strong tendency to divide into several species, and there may be differences in the hosts which they infest. I cannot separate the males in the same way.

In this paper *Gnathias cuneatus* and *ovatus* and *Xanthidium dentariæ* are described as new, and the male of *Centrias erigeronis* is described for the first time.

After *Cephen* was characterized as given in the table, I suspected that it might be the same as *Micronomada*, Ckll., but I could not identify that genus without getting specimens of the type, *N. modesta*, for examination. *N. modesta* has the cell III_5 strongly narrowed above, cell III_{1+2} less obtuse, and the vein *a* ends a little before or is interstitial with V_2. The front coxæ have a tubercle above the spine. The other structural characters are quite similar, and show that the two genera are closely related, but the venation is so different that I have decided to let *Cephen* stand. *N. fervida*, Sm., also belongs to *Cephen*.

Heminomada, Ckll., like *Micronomada*, Ann. Mag., N. H., VII., 10 : 42–4, 1902, I would raise to generic rank. Of 37 specimens in my collection, 9 have three submarginal cells in one or both wings.

Vein *rm*, usually wanting in *Heminomada*, I have also found wanting in *N. Cressonii* (1) and *Sayi* (1). Vein III_5 I have found wanting in *Gnathias cuneatus* (1), *Centrias Americanus* (1), *rubicundus* (1), *Nomada parva* (1).

I have to thank the authorities of the American Entomological Society for the privilege of examining co-types of *N. affabilis* and *bella* and specimens of *N. modesta*. Mr. Viereck noted several points in which the N. Y. specimen of *N. affabilis* differed from the co-type sent me for examination.

In his early descriptions Mr. Cresson mentions the structure of segment 7 of the males, and in his later ones notes the form of the joints of antennæ.

Females.

Mandibles bidentate; joint 3 shorter than 4; vein *a* before V_2; head and thorax red; sutures, depressed and concealed portions black..... *Gnathias.*

Mandibles simple..... .....1.

1. Front coxæ simple; rarely *(N. denticulata)* with short, indistinct spines..... .....3.

Front coxæ with long pubescent spines; abdomen distinctly punctured..... 2.

2. Joint 3 longer than 4; vein *a* beyond, or interstitial with, V_2; cell III_5 subquadrate, III_{1+2} obtuse; joint 1 of labial palpi twice as long

as 2–4, 2 flat, as long as 3 + 4, which are simple and directed obliquely outward ..... *Cephen.*

Joint 3 shorter than 4; vein *a* a little before V_2; cell III_5 more narrowed above; III_{1+2} acute; labial palpi ordinary; abdominal fasciæ, when present, continuous on segments 4–5, interrupted, reduced or wanting on 1–3..... ..... *Centrias.*

3. Joint 3 distinctly shorter than 4..... 5.
Joint 3 longer than 4, rarely a little shorter..... .....4.

4. Head and thorax without yellow ornaments, red; sutures, depressed and concealed portions black; vein *a* interstitial with V_2; apex of hind tibiæ with black curved bristles; joints 3–4 subequal; abdomen red, a whitish spot on each side of segments 2–3, two subdiscal, usually cuneate, spots on 4, and a transverse spot on 5; these marks sometimes wanting on 4, rarely on 2 and 5. ..... *Phor.*
Head and thorax with yellow ornaments, usually black.. *Holonomada.*

5. Head and thorax without yellow ornaments; vein *a* before V_2. ..... *Nomada.*
Head and thorax with yellow ornaments ..... 6.

6. Vein *rm* usually (75%) wanting in one or both wings; largely red; segments 2–5 with yellow fasciæ, sometimes interrupted on 2..... ...*Heminomada.*
Vein *rm* present; mesonotum with four yellow lines; segments 1–6 with yellow bands.....*Xanthidium.*

Males.

Mandibles bidentate..... *Gnathias.*
Mandibles simple..... 1.

1. Front coxæ simple, rarely (*N. denticulata*) with short, indistinct spines ..... 3.
Front coxæ with pubescent spines; abdomen distinctly punctured.. 2.

2. Scape ordinary; joint 3 longer than 4; vein *a* beyond, or interstitial with, V_2; cell III_5 subquadrate, III_{1+2} obtuse; segment 7 bifid..... ..... *Cephen.*
Scape robust; joint 4 = 5 + 6, 5 with a spine beneath; flagellum usually yellow beneath, middle joints short, submoniliform, the last produced to a point..... *Centrias.*

3. Segment 7 notched; joint 3 shorter than 4..... 5.
Segment 7 entire..... .... 4.

4. Joint 3 shorter than 4 : vein *a* interstitial with V_2 ; abdomen red, with whitish ornaments ..... *Phor.*
   Joint 3 longer than 4 ; abdomen black, with yellow ornaments ..... *Holonomada.*
5. Vein *rm* usually wanting ; segments 1–6 with yellow bands, that on 1 usually red ..... *Heminomada.*
   Vein *rm* rarely wanting ..... 6.
6. Segments 1–6 with entire and continuous bands, sometimes narrowly interrupted on 1 ; vein *a* before V_2 ..... *Xanthidium.*
   Segments 1–6 without entire and continuous bands, usually with some lateral spots ; when continuous, the bands have separated spots on extreme sides of 5 ..... *Nomada.*

Gnathias, gn. nov. (Type *Nomada bella*, Cresson).

Females.

Pygidium ovate, rather closely punctured and pubescent ; lower anterior orbits yellowish ; mesonotum commonly trilineate ; rather yellowish red, the spots small and hardly contrasting with the ground colour ..... *ovatus*, sp. nov.
70 specimens fall into the following forms, according to their colour patterns. The ornament on the side of segment 4 is counted as one spot. It consists of an elongated spot, or its representatives : (1) when the spot is broken in two, or (2) when the lateral portion disappears, leaving a subdiscal, more or less cuneate spot.
A spot on each side of segments 2–4 and a bar on 5 (10) .... *plenus.*
A spot on each side of segments 2–5 (15) ..... *octomaculatus.*
A spot on each side of segments 2–4 (1), or of 2, 3 and 5 (2) ..... *sexmaculatus.*
A spot on each side of segments 2–3 (15), or of 2 and 5 (3) ..... *quadrimaculatus.*
A spot on each side of segment 2 (22) ..... *binotatus.*
Abdomen without spots (2) ..... *unicolor.*

Pygidium triangular, sparsely punctured and pubescent ; lower anterior orbits not yellowish ; mesonotum one-lined ; rather dark red ; spots distinct, large on segment 2 ..... *cuneatus*, sp. nov.
28 specimens show the following forms, the ornaments of segment 2 as in the preceding :
A spot on each side of segments 1–5 (1) ..... *decemnotatus.*
A spot on each side of segments 2–5 (15) ..... *octonotatus.*

A spot on each side of segments 2, 3 and 5 (1).....*sexnotatus.*
A spot on each side of segments 2–3 (11).....*quadrisignatus.*

Males.

Intermediate joints of antennæ not longer than wide; tegulæ, knees and apex of tibiæ usually yellow; scutel black or marked with yellow, sometimes red; abdomen varying from 6-banded to 4-spotted.*ovatus.*
Intermediate joints longer than wide; tegulæ and legs red; scutel usually red; abdomen varying from 6-banded to 8-spotted.*cuneatus.*

Cephen, gn. nov. (Type *Nomada Texana*, Cresson).

Female.

Black; labrum, joints 1–3 and legs red; lemon-yellow ornaments as follows: Base of mandibles, sides of face, line behind summit of eye, collar, tubercles, subarcuate mark on pleura, two spots on scutel, postscutel, spots on middle and hind coxæ and on apex of hind tibiæ, narrow fasciæ on segments 1–5 above and arcuate marks on sides of 3–4 beneath.....*Texanus.*

Male.

Like the female; face, clypeus, spot above, and labrum lemon-yellow.....*Texanus.*

Centrias, gn. nov. (Type *Nomada erigeronis*, Rob.).

Females.

Insect red; sutures, depressed and concealead portions more or less black.....*Americanus.*
Insect black; mandibles, face, joints 1–3, tubercles, tegulæ, line above, patches on pleura, scutel, legs, and sometimes venter, red; malar space, collar, axillæ, postscutel and abdominal fasciæ, yellow; the latter interrupted on 1–3, continuous and paler on 4–5; abdomen coarsely punctured, margins of segments reflexed, beneath the punctures are coarse, strong and dense.....*erigeronis.*

Males.

Hind femur arcuate; antenna with a pale annulus; abdomen red at base, black beyond, yellow fasciæ interrupted on segments 1–2, continuous on 3–6; 7 strongly notched.....*Americanus.*
Hind femur simple; antenna without a pale annulus; abdomen black, yellow fasciæ interrupted on segment 1, continuous on 2–6, 7 slightly notched; other ornaments like the female, but the mandibles, face, scape in front, flagellum at base beneath, tubercles, tegulæ, spot on

pleura, coxæ and trochanters, more or less, and apices of femora and tibiæ, yellow ..... *erigeronis.*

Holonomada, gn. nov (Type *Nomada superba*, Cresson).

Females.

Metathorax entirely black ..... 2.
Metathorax with two yellow patches; abdomen with five yellow fasciæ ..... 1.

1. Mesonotum coarsely punctured, pubescent; vein *a* before V_2; flagellum dark above ..... *affabilis.*
Mesonotum finely punctured, nearly bare; vein *a* about interstitial with V_2; flagellum with a dark annulus ..... *vincta.*
2. Segments 1–5 with continuous yellow fasciæ; vein *a* usually before V_2; metathorax with dentiform lateral angles; scutel acutely bilobed ..... *superba.*
Segment 1 black, or with ferruginous stain, 2–3 with interrupted, 4–5 with continuous bands; vein *a* not before V_2; scutel hardly bilobed: joint 3 sometimes a little shorter than 4; small ..... *placida.*

Males.

Metathorax and posterior orbits black, or nearly so ..... 2.
Metathorax with two yellow spots; posterior orbits largely yellow. 1.

1. Scape obovate; vein *a* usually interstitial with V_2; flagellum darker in the middle; scutel subbilobed ..... *vincta.*
Scape ordinary; vein *a* usually before V_2; flagellum darker above; scutel bilobed ..... *affabilis.*
2. Segments 1–6 with continuous yellow bands; vein *a* usually before V_2; large species ..... *superba.*
Segments 5-6 with continuous, 2–4 with interrupted, yellow bands, 1 entirely black; vein *a* usually interstitial with V_2; small species ..... *placida.*
Phor., gn. nov. (Type *Nomada integra*, Rob.) ..... *integer.*
Heminomada, Ckll. (Type *Nomada obliterata*, Cresson) ..... *obliterata.*

Xanthidium, gn. nov. (Type *Nomada luteola*, Oliv.).

Females.

Metathorax with subquadrate marks encroaching upon enclosure ..... *luteolum.*
Metathorax with subtriangular marks not encroaching upon enclosure ..... *luteoloides.*

Males.

Flagellum denticulate beneath; orbits yellow, except at summit behind ..... *luteoloides.*

Flagellum ordinary; orbits yellow below ..... 1.

1. Band on segment 1 interrupted; flagellum submoniliform, fulvous beneath ..... *dentariæ*, sp. nov.

Band on segment 1 continuous; flagellum unusually dark, piceous beneath, the joints unusually cylindrical ..... *luteolum.*

Nomada Scop.

Females.

Head and thorax black, with ferruginous ornaments; abdomen black, with yellow ornaments; interrupted line on segment 1, lateral marks on 2–3, continuous fasciæ on 4–5 ..... *vicina.*

Head and thorax red, sutures, depressed and concealed portions black ..... 1.

1. Scutel quite low, convex, hardly bilobed; joint 4 shorter than 12; black colour of head and thorax rather preponderating over the red; a yellow spot on each side of segments 2–3, two spots on each side of 4, a band or two spots on 5 ..... *simplex.*

Scutel crested, bilobed ..... 2.

2. Joint 4 shorter than 12 ..... 5.

Joint 4 as long as 12 ..... 3.

3. Front coxæ with short spines; pygidium subacute; yellow fascia on segment 5 opaque, finely rugose, rather sparsely, feebly punctured; scutel strongly crested ..... *denticulata.*

Front coxæ without spines; pygidium broadly subtruncate ..... 4.

4. A spot on each side of segments 2–3, two subdiscal cuneate spots on 4; band on 5 shining, coarsely punctured; larger ..... *Cressonii.*

A spot on each side of segments 2–3; smaller ..... *Sayi.*

5. A spot on each side of segments 2–3, and usually a band or two spots on 5; pygidium broadly rounded, closely pubescent .. *Illinoiensis.*

A spot on each side of segments 2–5; the smallest species ... *parva.*

Males.

Abdomen mainly reddish; vein *a* before V_2 3

Abdomen mainly black ..... 1.

1. Segments 2–3 with a spot on each side, 1 usually with an interrupted band, 4 with a band or two spots on each side, 5 with a discal band

and a spot on each side, 6 like 5, or the lateral spots wanting, 7 with apex slightly notched ..... *vicina.*

Segments 1–6 with bands continuous, or nearly so, usually a separated spot on each side of 5 ..... 2.

2. Joints 7–10 wider than long; segment 7 strongly notched; pleura, scutel and legs marked with yellow; vein *a* beyond V_2 ..... *salicis.*

Joints 7–10 longer than wide; segment 7 slighly notched; pleura and scutel black; legs less yellow; vein *a* before V_2 ..... *simplex.*

3. Flagellum distinctly denticulate beneath; front coxæ with short spines; a spot on each side of segment 2, sometimes one on 1, usually continuous bands on 3–6 ..... *denticulata.*

Flagellum and front coxæ ordinary .. .. 4.

4. Joint 4 shorter than 13 ..... 6.

Joint 4 as long as 13 ..... 5.

5. Thorax largely red; larger ... . *Cressonii.*

Thorax almost entirely black; smaller ..... *Sayi.*

6. Apical half of abdomen reddish; middle joints of flagellum longer than wide ..... *Illinoiensis.*

Apical half of abdomen blackish; middle joints of flagellum hardly longer than wide ..... *parva.*

THE NORTH AMERICAN SPECIES OF PEDILOPHORUS.

BY H. F. WICKHAM, IOWA CITY, IOWA.

The Byrrhidæ of this continent have received a comparatively small share of attention at the hands of systematists for many years, so that it is not at all surprising to find novelties among recently-collected material. Two new forms of the genus *Pedilophorus* have recently been detected among the accumulations in my cabinet, both of them from the west; no doubt still others remain to reward explorers of the mountain ranges and of the northern districts. The European fauna contains ten species, while but four were previously known from North America. For the sake of better understanding of the new forms, I have constructed the following table, by means of which our native species may be identified:

A. Elytral punctuation disposed in broad vittæ, alternating with nearly smooth stripes. .34 inch ..... *Lecontei*, n. sp.

AA. Elytral punctuation not disposed in vittæ.

b. Tarsi simple. A green-bronzed species, clothed with coarse whitish hairs. .17 inch ..... *æneolus*, Lec.

bb. Tarsi with third joint lobed beneath.

c. Bright green or bronzed species, pubescence fine, recumbent, without intermixed bristles.

d. Acuminate behind, the elytra narrowing from in front of the middle.

.16 inch..... *acuminatus*, Mann.

dd. Form oblong, elytra parallel, or nearly so, to a point about one-third from tip.

.18 inch..... *oblongus*, Lec.

cc. Blackish species, metallic tinge lacking or inconspicuous.

e. Pubescence extremely fine, whitish and ochreous, intermixed with conspicuous black bristle-like hairs. .17 inch..... *subcanus*, Lec.

ee. Pubescence whitish or yellowish, not intermixed with bristle-like hairs. .16 inch. *hesperus*, n. sp.

In a cabinet arrangement it might be better to place *oblongus* between *acuminatus* and *æneolus*, and to make *subcanus* follow *hesperus* rather than precede it. This is the sequence I have adopted in the notes below.

P. Lecontei, n. sp.—Oblong-ovate, very convex, bronzed, shining, with extremely fine, sparse, recumbent pubescence. Head with fine, well-separated punctures, front convex. Antennæ gradually clavate, passing the base of the thorax, blackish, the intermediate portion reddish; first joint large, second subglobose, third nearly twice as long as the second, but much more slender, fourth to tenth becoming broader, but subequal in length, eleventh oval, pointed. Thorax broadest at base, strongly narrowed anteriorly, sides scarcely arcuate, a rather deep submarginal lateral impression, which curves inward at the hind angles; posterior angles large, acute, but with somewhat irregular outline, basal marginal line distinct, fine, a small fovea in front of the scutellum; disk finely, regularly punctured, the punctures separated by a space about equal to their own diameters. Elytra continuing the outline of the thorax, becoming slightly broader to a point about one-third from apex, thence rapidly narrowing, tips separately rounded; an oblique impression near the apex, which renders the declivity more gibbous; surface deeply, regularly and rather closely punctured in longitudinal bands, which leave the sutural region and four vittæ on each elytron nearly smooth. Beneath rather coarsely and deeply-punctured abdominal segments becoming gradually smoother in sequence. Legs closely punctured, all the femora

grooved; tibiæ finely spinulose externally; the anterior pair somewhat enlarged towards apex, the middle and hind ones of approximately uniform width in distal two-thirds. Third tarsal joint with a long lobe. Length, 8.5 mm.

This species is much larger than any of the other described North American forms, and looks very much like an *Amphicyrta*. The peculiar punctuation of the elytra gives a vittate effect, recalling *Cytilus*, but there is no alternation of elevation. Only the front tibiæ are distinctly grooved for the reception of the tarsi. The antennal club is so gradually formed that it is difficult to say where it begins; the third and fourth joints are of nearly the same width, while in the fifth the enlargement has became apparent.

Cœur d'Alene, Idaho, two specimens, taken by myself in June, under logs. A third specimen from Vernon, B. C., collected by Mr. Venables and communicated by Dr. Fletcher, is slightly smaller, more brilliant, and a trifle more coarsely punctured, the marginal line of the prothorax is less marked, and the head has a frontal transverse row of three foveæ, of which the middle one is larger and deeper. These foveæ are non-essential, however, since one of my specimens has the median one distinct, the other showing also traces of the lateral foveæ.

P. æneolus, Leconte, New Species of North American Coleoptera, Sm. Misc. Coll., No. 167, 1866, p. 74. Originally described from a specimen in the Ulke Collection, captured in Nebraska. I have a number of examples of a Pedilophorus from Kalispell, Montana, which may belong here, though I am not quite satisfied with the determination. Mr. Fall expresses himself as being in doubt as to their exact status, and neither he nor myself have seen the type, which is now presumably in the Carnegie Museum at Pittsburg.

P. oblongus, Leconte, Report upon Insects collected on the Survey, Pacific R.R. Expl. and Surv., 47th and 49th parallels, p. 39 of separate. *P. acuminatus*‡, Leconte, Proc. Acad. Nat. Sci., Phil., Vol. VII., p. 115. Oregon, Leconte. I have specimens from Seattle, Washington, collected by S. Bethel.

P. acuminatus, Mannerheim (*Morychus acuminatus*), Bull. Soc. Imp. Nat., Moscow, 1852, p. 341. The type specimens were collected under stones, among moss, at Sitka, Alaska, by Frankenhæuser and Pipingskœld. Dr. Fletcher records it as being taken at Massett, Queen Charlotte Islands, under moss during the winter, by Rev. J. H. Keen. I took a single

individual at Hunter's Bay, Alaska, from a cut place on the trunk of a conifer. Two specimens in my cabinet, collected by Rev. Geo. W. Taylor, at Nanaimo, Vancouver Island, are a little more deeply punctured.

P. hesperus, n. sp.—Oblong, blackish, feebly shining, a faint æneous tinge, pubescence pale, recumbent, moderately coarse. Head deeply and densely, rather coarsely, punctured, front with a distinct median fovea, around which the punctures are less crowded. Antennæ gradually clavate, about reaching the base of the thorax, piceous-red, club blackish; first joint large and heavy, second subglobose, not quite as thick as the first, third more slender than the second but nearly as long, fourth and fifth subequal, a trifle shorter than the third, sixth broader, seventh to tenth wide, subequal in length, eleventh nearly twice as long as the tenth, oval, pointed. Thorax distinctly, finely and rather closely punctured, narrowed anteriorly, the sides not arcuate but slightly sinuate, lateral margin sharp, front and hind angles acute. Scutellum covered with pale yellowish pubescence. Elytra continuing the outline of the thorax, finely, distinctly and fairly closely punctured and indistinctly sulcate, sides subparallel, tips conjointly rounded. Beneath rufo-piceous, thickly clothed with pale pubescence, which almost conceals the sculpture, especially on the abdomen. Legs piceous, femora paler, all grooved for the reception of the tibiæ. Tibiæ spinulose externally, front and middle pairs with exterior margin arcuate, hind pair simply broader towards tip. Third tarsal joint lobed beneath. Length, 4 mm.

Leadville, Colorado, July, taken by myself under stones on a hillside. The front tibiæ alone are grooved for the reception of the tarsi. The antennæ are much stouter in comparison than those of *P. Lecontei*. In general appearance this insect approaches *P. subcanus*, but is at once distinguished by the lack of bristly hairs among the pubescence. From *acuminatus* it may readily be separated by colour and outline; *oblongus* differs in the bright green colour, strongly shining surface and lack of elytral sulcations, while *æneolus* should at once be separable by the simple tarsi.

P. subcanus, Leconte, Coleoptera of Michigan, Proc. Am. Phil. Soc., XVII., 1878, p. 609. Described from Escanaba, Lake Superior. I have it from Bayfield, Wisconsin, on the southern shore of the same lake, and from Leadville, Colorado.

Mailed June 4th, 1903.

The Canadian Entomologist.

Vol. XXXV. LONDON, JULY, 1903. No. 7

A COLEOPTEROUS CONUNDRUM.

BY ANNIE TRUMBULL SLOSSON.

A year ago, May 1902, I had a peculiar entomological experience. I had returned from Florida to my home in New York about the middle of April, had spent two or three weeks arranging and classifying my captures of the winter, sending off duplicates and doubtful species to specialists, and preparing my collection for the summer months of my absence. A full fortnight must pass before I should leave town for my New Hampshire summer home, and I already pined for a little collecting. Suddenly I recalled the existence of some old boxes of insects which had been crowded out of my regular collection-room some years before. They were in a closet opening from a hall on the second floor. This closet had been built especially for the preservation of woollen clothing and its protection from ravages of the devouring moth, its walls, shelves and drawers being made of red cedar. But after a period of many years—nearly forty, I think—the wood has lost its protective odour, and the place is often visited by insect pests. It, however, still bears the name of the "cedar-closet," and here had been stored for several years the overflow from my collection. In a leisure hour, one chilly May day, feeling a touch of the entomologist's fitful fever, I said to a friend, in a sportive mood, "I am going to try the cedar closet, who knows what discoveries I may make in those old boxes of bugs?" As unconscious of the great discovery awaiting me there as was probably Isaac Newton before that attractedly gravitating apple fell to the ground, I started on my quest. The first box I opened contained lepidoptera from Franconia, chiefly moths, taken several years before, and of little value or rarity. It was a wreck, clouds of dust rose from it as I lifted the cover, and broken bits of wings and bodies rolled about as I moved the box. Disagreeable, stealthy Anthrenus larvæ, of all sizes, glided about among the ruins. Of course this must be attended to, and the infested specimens thrown away; so I carried the box with its contents to my room for further examination.

There was a little fire burning in a low grate, and into this I began throwing the insect debris. As I tried to pick up some of the slippery Anthrenus larvæ I noticed among them what seemed to be tiny brown ants. I had never seen any ants in the cedar-closet, so wetting my finger I lifted one of the little creatures and dropped it into a poison bottle. When it was quiet I took it out and examined it with my magnifying glass. It was no ant, but—what was it? I had never seen anything resembling it. Indeed, for a time I was not sure even to what order it belonged. Was it hemipterous, hymenopterous, coleopterous, or what? I put a half dozen specimens into the bottle, and a little later mounted two of them on a card triangle and sent them to Mr. Liebeck, in Philadelphia, for identification. At this juncture I felt no excitement, not much curiosity. Though quite unfamiliar to me, the species was probably well known to experienced entomologists as a museum pest: thus I thought to myself. But next day came a postal from Mr. Liebeck. He did not recognize my capture: had seen nothing like it; had it not been introduced with some of my specimens from South Florida? he asked. "It is a very curious insect, apterous, you see. Though provided with jaws and elytra, the usual characteristics of coleoptera, its antennæ seem very peculiar ones for a beetle. But I will examine it further and report." Thus he wrote, and I began to feel the first thrill of interest. This certainly could not be a familiar museum pest if such an experienced entomologist as Mr. Liebeck failed to recognize it. I went back to my box of infested moths and sought more specimens of the cunning little pest, securing about twenty specimens. These I carried with me to the mountains when I went there the latter part of May. Soon after my arrival in Franconia I sent specimens to Mr. Frederick Blanchard, and he wrote concerning them: "These beetles are very queer indeed; I haven't at present the slightest idea what they are related to. They reminded me at first sight of certain small Hemiptera. I hope to send you something further about them before very long."

A fortnight later Mr. Blanchard wrote again: "The very remarkable little beetle which you found devouring your specimens with Anthrenus is still an interrogation. I can, so far, find nothing at all like it in any of my boxes. A week ago I sent sketches with details, asking Henshaw's aid, but I haven't a word from him yet. The beetle is so very peculiar it should be easily identified if well known. The antennæ appear to be entire and alike in both specimens, but with only nine joints, 3–5 being

rather difficult to count, they are so small. One of the long joints is shorter than the others, but I don't recall whether it is the 7th or 8th. This is a very peculiar form of antenna, and would still be so if there were the normal number of eleven joints. Your insect is furnished with a single ocellus between the eyes, which is a very rare character in beetles. Some Dermestidæ have one ocellus, and in the Homalini of the Staphylinidæ there are two somewhat distant ones. The only other instance I have been able to find is in the case of *Hylotomus bucephalus*, from Sierra Leone, belonging to the family Paussidæ, which is not represented in this country. Here there are again two ocelli. I shall probably hear from Cambridge in a day or two, and will write you again." A few days later he wrote: "I heard from Henshaw yesterday. Like myself, he is unable to furnish any clue at all to the beetle's relations. I think that all that can be said of it is that it is a member of the great Serricorn series, which includes such a variety of types. In the Leconte and Horn Classification this embraces families XXXIX.—LI., but Casey (Jour. N. Y. Ent. Soc., Vol. VI., p. 76) is inclined to go further and add several other groups, hitherto considered Clavicorn. Just where your beetle comes in I can't say. The whole arrangement of the Serricornia would have to be carefully studied first, as it does not appear that your anomaly belongs to any recognized family." I had, in one of my letters to Mr. Blanchard, spoken of the varied contents of the cedar-closet in which the puzzling pest was found, and hinted jocosely that the presence of some ancient Egyptian relics, mummy wrappings, beads and images of Osiris, might possibly account for this strange visitant. He writes: "I note your playful remarks about a possible relation to ancient Egyptian dynasties, disclosed from the tombs of the Pharaohs and starting upon a new career of uselessness, and am reminded of the stories of still fertile seeds of grain reported to have been taken from tombs in the land of the Nile."

In the meantime I had sent specimens to Messrs. Schwarz and Fall. The former was too busy just then to reply, but I heard through others that he was unable to throw any light on the matter. Mr. Fall wrote: "I have just received your letter and the box containing specimens of that most astonishing little creature found eating your specimens in New York. I would like much to know the circumstances a little more exactly. Were the specimens attacked native or exotic? If native, were they from Florida? And how long had they been in the box? Could they have found access from any other source in the closet itself? I feel sure that

the beetle is not a member of our fauna. I saw Mr. Schwarz in Washington, and asked him if he had located your find. He said he could make nothing of it. I shall at once send one, at least, of the specimens to Dr. Sharp, and will promptly report to you what he says. An attempt to place it with our classification gives only negative results, but it certainly possesses as many points in common with the Lymexylidæ as with any family which we have. But that frontal ocellus ! ! And those antennæ ! ! ! I hope to study it further soon." A few weeks later Mr. Fall wrote again, and, referring to what he calls "your conundrum which none of us can guess," he said: "I sent a specimen to Dr. Sharp, of Cambridge, England, and have to-day received a letter from him, in which he admits never having seen anything like it. There is nothing at all resembling it in the Palearctic fauna, he says. He doesn't know what family to assign it to, but suggests that it may belong to the Dermestidæ, on the strength of the frontal ocellus. The mystery deepens. The creature is such a ghostly, unsubstantial thing for a beetle—a regular coleopterous ghoul—that I almost find myself wondering if, when I look in the box again, I won't find it vanished into thin air. Did you find it actually feeding on the specimens? Was there sign of larvæ? Pardon my numerous questions, but the case is so remarkable that I would get all possible information. We must, perhaps, put some coleopterous Sherlock Holmes on the trail to run this fellow down." After another letter from me he writes: "The fact that you found numerous larvæ of Anthrenus in your box of moths would certainly account for the damage done, but the further fact of shaking these little creatures from the bodies of the moths would indicate that they themselves were not entirely guiltless. I suppose the age and character of the box is such that the beetles could not possibly have come from its wood or lining? Well, I give it up." And there my story practically ends.

Before I left New York in May I had bottled all the specimens I could find in the infested box and returned it, with its debris of half-devoured insects, to the cedar closet. There also were at least a half dozen similar boxes containing insects, all infested by Anthrenus, and possibly other pests, but not one of the little anomalous creatures could be found among these. On my return in October I at once opened the closet and examined my "traps" with their tempting bait. Not a sign of the curious beetle was there. Nor has it ever reappeared. My little stock obtained a year ago is much diminished, I having sent specimens to various correspondents. Shall I ever find more specimens of what I have sometimes,

in chat over my discovery, styled *Ignotus ænigmaticus?* I trow not. For me—a woman, and therefore, of course, full of vain imaginings—those creatures had no beginning; no egg, grub or pupa preceded them; no weary, slow-paced evolutionary process developed the strange little beings. They sprang into full, perfect imago life in those May days, having no family, no relations, belonging to no class, their secret to be unlocked by no key, artificial or natural; unfathomable mysteries, unsolvable problems, unguessable conundrums. Was it to confound the wise they came? to fulfil a prophecy I find in a certain old book, "Then shall the seers be ashamed, and the diviners confounded"?

BUTTERFLY NOTES FROM TORONTO FOR 1902.

BY J. B. WILLIAMS, F. Z. S.

On the 24th of May I went collecting, with a friend, in High Park. We each took a specimen of the Tailed-Blue *(L. comyntas)*, but found, as we had expected, that it was too early for Scudder's Blue. On turning over an old boot that was lying on the grass, I saw a chrysalis of *L. Scudderii* attached to the under side; an ant was also on the sole of the boot, and ran round and round and over the chrysalis several times before going away; being, apparently, quite agitated by the disturbance. Is it possible that this ant was keeping some sort of guard over the chrysalis, as ants are supposed to do over the larvæ of *L. Scudderii?* Its presence on the boot may have been merely accidental, but still, its movements gave one the impression that it was loth to leave the chrysalis, and would have liked to carry it away, if that had been possible.

A slight touch removed the pupa from the boot, and I kept it until the 30th of May, when the butterfly emerged, and proved to be a female.

On September 20 and 27 I collected in two places where large numbers of the Clouded Sulphur *(Colias philodice)* were flying about, and noticed a good many of the white female form. I took five of them, altogether, and saw several more that I did not capture.

In 1901, I do not remember seeing a single white specimen. Is it right to speak of these females as albinos; at any rate, in the ordinary sense in which that word is used? Mr. Grote suggested, in the CANADIAN ENTOMOLOGIST for April, 1902, the probability of the dark female form "glaucus" of *Papilio turnus*, being a recurrence of the colour of an earlier species from which it had been derived; as female butterflies generally represent the conservative element, and males the liberal or progressive side, of insect life.

The white female of *Philodice* may, therefore, be a colour survival of some whitish butterfly from which all the species of *Colias* were originally derived. Some of them have still altogether white females; while others, like our *Philodice*, have the two forms—the older type being the scarcer of the two. Northern Asia seems to be the special home of the genus, so that the original *Philodice* may have come to us from north-east Siberia, via Alaska; and perhaps somewhat resembled the existing Arctic Sulphur (*C. nastes*).

There is a small opening in the woods at High Park, where Leonard's Skipper is usually abundant, during the brief period of its existence as a butterfly. A stream runs along one side, and grass and flowers and bits of marshy ground make it an ideal home for several members of the Skipper family.

On the 30th of August I found plenty of males there that had recently emerged, but none of the other sex. By the middle of September females were plentiful, but males hard to find. One wet and cloudy afternoon, when all other butterflies had disappeared, two specimens of *Leonardus* were seen resting on the flowering plants in this opening. I went there on September the 27th, hoping to bring home some live females and secure some eggs, but all had disappeared. So that in this locality, apparently, their butterfly existence lasts for barely one month out of the twelve. Many common butterflies were scarce last summer, owing, I suppose, to the comparatively cold and wet season; but the Skippers did not seem to be much affected thereby, and were plentiful all through the summer.

TWELVE-SPOTTED ASPARAGUS BEETLE IN CONNECTICUT.

Crioceris 12-punctata, Linn., is an introduced species, and has been working northward from Maryland, according to Professor J. B. Smith, who some time ago informed me that it was present in New Jersey, and would in time reach Connecticut. The first specimen recorded from the State was taken by a student assistant June, 16th, 1902, who collected a single specimen on asparagus upon the Station grounds in New Haven. On May 23rd, 1903, I took male and female specimens from the same locality. We may now expect this species to become thoroughly established here as a pest of asparagus, injuring the plants in the same manner as the common asparagus beetle, *C. asparagi*, Linn.—W. E. Britton, New Haven, Conn.

A NEW CULICID GENUS RELATED TO CORETHRA.

BY D. W. COQUILLETT, WASHINGTON, D. C.

The genus *Corethra* was founded by Meigen in 1803,* on *Tipula culiciformis*, De Geer, and in April, 1844, Loew erected the genus *Mochlonyx*,† on *Corethra velutina*, Ruthe, basing it on the shortened first joint of the tarsi, a character mentioned by Ruthe in his original description. The characters of the tarsi of *culiciformis* cannot be ascertained from De Geer's description and figures.‡ On page 386 of the same volume of his Memoires, which contains the account of this species, is a description and brief account of a related species, which he named *Tipula crystallina*, with a reference to Reaumur's Memoires, V., plate 6, figures 4–15, where, at 4 and 7, a more slender larva without a trace of a subanal respiratory tube is shown, contrasting with the broader larva furnished with a large respiratory tube, as represented in De Geer's figures of *culiciformis;* the descriptions and figures which these authors give of *crystallina* do not indicate the characters of the tarsal joints of the adult. Thus matters stood at the time that Loew erected his genus *Mochlonyx*, and continued so until the year 1883.

In that year Dr. Fr. Meinert, of Copenhagen, published the results of his breeding of the adults from these two forms of larvæ,§ asserting that the tubeless larva of *crystallina* produced an adult with elongated first tarsal joints as in *Corethra* in the sense of Loew, whereas the adult bred from the larva of *culiciformis* had the very short first tarsal joints of *Mochlonyx*. Some of the adults last mentioned were submitted to V. von Röder, of Hoym, Germany, an experienced dipterologist, who confirmed their reference to *Mochlonyx*,‖ adding that, with the exception of having the hairs on the abdomen and legs shorter, they are identical with Ruthe's species, two specimens of which were in his collection, received from Ruthe himself. It seems very certain, therefore, that the type species of

*Illiger's Magasin, II., p. 260. †Ent. Zeit. Stettin, p. 121. ‡Memoires, VI., p. 372, pl. 23, figs. 3–12. §Overs. Kon. Danske Vid. Selsk, Forh., pp. 1–17, and Resume, pp. 7–11. ‖Entom, Nach., July, 1885, p. 217.

Mochlonyx, if not the same, is at least congeneric with that of *Corethra*; in other words, Loew applied the former name to the wrong division of *Corethra*, in consequence of which his proposed new generic name is a pure synonym of the latter.

Owing to the mistake of Loew, it will be necessary to give a new generic name to the group representing *Corethra*, Loew (not Meigen), and for this genus the name *Sayomyia* is proposed, in honour of the immortal Thomas Say; it will be readily recognized among the short-beaked Culicidæ by having the hairs of the antennæ gathered into whorls, the intervening spaces being almost bare, and by having the first tarsal joint longer than the second. The type species is *Corethra punctipennis*, Say.

The genus *Corethra* (= *Mochlonyx*) has not yet been reported from this country. Several years ago I received a specimen from Mrs. Annie T. Slosson, collected at Franconia, N. H., and later two more specimens were received from the same source, while in April of the present year the same species was detected at Mt. Vernon, Va., by Mr. W. V. Warner, of the U. S. National Museum. This species will readily be recognized by its banded legs and mottled wings, and may be characterized as follows: *Corethra cinctipes*, new species.

Blackish brown, the apices of the antennal joints except the last joint, the halteres, bases of the segments of abdomen in the male, base and under side of femora, a broad band near four-fifths of their length, their extreme apices, bases of tibiæ and a band near one-fourth of their length, also bases of the first three or four joints of the tarsi, yellow; hairs of male antennæ brown, their bases yellow, those at tips of antennæ almost wholly yellow; thorax grayish pruinose, marked with four black vittæ; wings grayish hyaline, hairs of veins black and with yellow ones as follows: on the bases and apices of the veins, on the first vein where the second issues from it, on the second vein where the third issues from it and at the point where it forks, on the fourth vein at the insertion of the cross-vein and also where this vein forks, and on the fifth vein where it forks; first submarginal cell nearly twice as long as its petiole, cross-vein at apex of second basal cell less than its length before the one above it; tarsal claws of male each bearing two long, slender teeth on the under side, one near the base and the other near the middle, those of the female with a single tooth near the base of each; length, 3 to 4.5 mm. Five males and one female. Type No. 6839, U. S. National Museum.

SOME NEW RECORDS OF COCCIDÆ.

BY GEO. B. KING, LAWRENCE, MASS.

The following list of Coccidæ, which have been sent to me for study, adds considerably to the known range of a large number of species, while several new food-plants are indicated; and as no records of the species herein cited have appeared, to my knowledge, other than in one or two instances in some of my published papers on the *Coccidæ*, it seems, therefore, that these miscellaneous results should be recorded. It will also show to some extent what is being done in a private laboratory for the advancement of science. I have classified the records for my own convenience into States as follows :

Maine.

These were all collected and sent to me by Mr. Oliver O. Stover, of Freeport, Maine, in 1901 ; the first two species living out of doors and the remainder being found under glass in greenhouses.

Calymnatus hesperidum and *Aspidiotus hederæ* on *Hedera hybernica* were associated together.

Mytilaspis ulmi, L., on apple twigs, Portland, Me.

Chionaspis furfurus, Fitch, on bark of apple, Westbrook, Me.

Diaspis Boisduvalii, Sign., on *Latania barbarica* and *Livingstonia Chinensis*, Portland, Me.

Aspidiotus hederæ, Vall., on *Oleander* at Westbrook, and on *Japonica variegata*, Portland, and on *Hedera hybernica* at Portland, Me.

Calymnatus hesperidum, L., on *Yucca*, Westbrook, Me.

Vermont.

These were collected by Mr. C. Abbot Davis, of Providence, R. I., in 1902, at Burlington, Vt.

Eulecanium quercitronis, Fitch., on oak.

Pulvinaria innumerabilis, Rathv., on maple.

Connecticut.

Prof. W. E. Britton, of the Connecticut Agricultural Experiment Station, New Haven, Conn., sent the following in 1902 :

Saissetia filicum, Boisd., on fern *(Eyrtominum falcatum)* in Station greenhouse.

Saissetia hemisphærica, Targ., on fern *(Pteris trimula)*, and *Dryopteris mollis ?* in Station greenhouse.

Eulecanium Kingii, Ckll., on sassafrass, and an *Eulecanium*, Sp., found on grapevine, Bristol, Conn., which were in poor condition and undeterminable.

Dr. Geo. Dimmock, of Springfield, Mass., on a short collecting trip found the following species in Conn. in 1900 :

Saissetia hemisphærica, Targ., on two distinct species of fern in a greenhouse, Warehouse Point, Conn.

Mytilaspis ulmi, L., on leather leaf *(Cassandra calyculata)* and on *Fraxinus Americana*, Milford, Conn.

Chrysomphalus dictyospermi, Marg., on *Ficus elastica* under glass, Enfield, Conn.

Asterolecanium variolosum, Ratz.—Sent to me recently by Prof. Britton ; on scarlet oak ; found by the superintendent of parks in Hartford, on a single tree in a nursery. The scales evidently had killed the tree, as the twigs sent me were dead.

Rhode Island.

Mr. C. Abbot Davis collected and sent the following in 1902 :

Eulecanium nigrofasciatum, Perg., on soft maple in Roger Williams Park, Providence, R. I., and attended by ants.

Eulecanium quercitronis, Fitch., on black and white oak and white maple ; also on cork tree (imported) in Roger Williams Park, Prov., R. I.

Eulecanium Fletcheri, Ckll., on white cedar, Providence.

Eulecanium cerasifex, Fitch., on wild black cherry, peach and pear.

Eulecanium Cockerelli, on wild black cherry, Prov., R. I.

Eulecanium persicæ, Fabr., on linden and pear, attended by *Formica lasioides*, var. *picea*, Em.

Eulecanium Canadense, Ckll., on red and white maple, tulip tree, linden and two other imported trees, species unknown, in Roger Williams Park, Providence.

Eulecanium cynosbati, Fitch., on locust, Providence.

Calymnatus hesperidum, L., on orange in a dwelling-house, Providence.

Pulvinaria innumerabilis, Rathv., on an imported tree in Roger Williams Park, Prov.

Pulvinaria rhois, Ehrh., on sumac, Providence.

Kermes Kingii, Ckll., on black oak, in Roger Williams Park, Prov.

Kermes pubescens, Bogue, on white oak in Roger Williams Park, Prov.

Gossyparia ulmi, Geoff., on bark of elm in Roger Williams Park, Prov.

Phenococcus acericola, King, on maple, Providence.

Aspidiotus, sp., probably new, on white pine, Providence; not sufficient for study.

Chionaspis furfurus, Fitch., on bark of apple, Providence.

Chionaspis pinifolii, Fitch., on white and Scotch pine, Roger Williams Park, Prov.

Chionaspis Americana, Johns, on elm, Providence.

Mytilaspis ulmi, L., on dogwood ?

The following species were found associated together: *E. cerasifex* and *E. Cockerelli* on wild cherry, *E. persicæ* and *E. Canadense* on linden, *E. persicæ* and *E. cerasifex* on pear, *E. cerasifex* and *E. Cockerelli* on elm.

Georgia.

The following were received from Prof. W. M. Scott, State Entomologist of Georgia, 1902:

Pulvinaria innumerabilis, Rathv., on pecan and black gum at Albany.

Eulecanium magnoliarum, Ckll., on *Magnolia grandiflora*, Marshallville.

Eulecanium tulipiferæ, Cook, on tulip tree.

Mississippi.

The following were received from Prof. Glenn W. Herrick, of the Mississippi Agricultural Experiment Station in 1902:

Chrysomphalus tenebricosus, Comst., on maple, Vicksburg, Miss.

Aspidiotus perniciosus, Comst., on peach, Deean, Miss.

Aspidiotus Forbesi, Johns, on peach, Stinson, Miss.

Illinois.

Eulecanium fraxini, King, on bark of ash, Urbana, Ill., sent in by Prof. F. M. Webster, January, 1903.

Eulecanium Folsomi, Ckll. This is a small flat species found by Prof. Folsom in 1902 on paw-paw, at Urbana, Ill.

Antennæ 6-jointed, in μ as follows:

Joints	1	2	3	4	5	6
	40	36	92	16	20	40
	40	36	96	20	24	36

Legs thin; coxa, 88; femur and trochanter, 108; tibia, 92; tarsus, 76; claw, 16; marginal spines of two sizes, 16 and 32 μ long. Stigmatal spines in threes, middle one 60 μ long; laterals, 32 μ long. I think the above species is yet to be published by Prof. Cockerell.

IOWA.

These were sent by Prof. Cockerell, collected by Prof. W. D. Hunter in 1900, now of the Dept. of Agriculture at Washington, D. C.

Eulecanium Cockerelli, Hunter, Ames, Iowa.

Eulecanium Websteri, King, on *Celtis occidentalis*; also on *Acer saccharinum*, Ames, Iowa.

ARIZONA.

Pulvinaria innumerabilis, Rathv., on *Acer negundo*, Prescott, Ariz.; coll. Cockerell, March 27, 1902.

CALIFORNIA.

The following species were collected by Prof. Cockerell while taking some students and teachers through part of California in the summer of 1901, and were referred to me for study:

Aspidiotus hederæ, Vall., on leaves of *Eucalyptus*, Pasadena, Calif.

Aspidiotus rapax, Comst., on *Isomeris arborea* at San Pedro, Calif.

Eriococcus adenostomæ, Ehrh., on *Adenostoma* at La Jolla, Calif.; also on the same food-plant at San Pedro, Calif.

Ceroplates irregularis, on *Atriplex confertifolia* and *A. polycarpa* at Lone Pine, Inyo Co., Calif. They occur only near or under the ground.

Dactylopius salinus, Ckll., on grass on cliffs by the sea at La Jolla, Calif.

Chionaspis pinifolii, Fitch, on Pinus, sp.

Pseudolecanium Californicum, Ehrh.

Saissetia oleæ, Bern., was also found on this trip by Prof. Cockerell.

Saissetia hemisphærica, Targ., on pepper tree (*Schianus malla*), La Jolla, Calif.

COLORADO.

The following species were collected by Prof. Bethel, High School, Denver, Colorado, and sent to Prof. Cockerell, who turned them over to me:

Chionaspis Lintneri, Comst., on *Ceanothus*, Steamboat Springs, Colorado.

Phenacoccus Cockerelli, n. sp.

♀ Scale red-brown, resting on a small white cottony sack projecting a little behind the insect's body. Size small ; owing to its position upon the twigs, an accurate measurement could not be obtained. Cleared and pressed under a cover glass, 2 mm. in diameter, a little narrow behind. Derm colourless, mouth-parts yellowish-brown, antennæ and legs slightly tinged with yellow. Anal lobes well developed, rounded, with one long bristle and several short spear-shaped spines and a few thin hairs ; they also show several round gland pits, these due, perhaps, to some of the spines being lost in process of clearing. No spines, pits or hairs on the derm.

Antennæ 9-jointed ; measurements in μ, joints :

1	2	3	4	5	6	7	8	9
36	52	48	36	40	36	36	32	60

Front leg coxa, 80 ; femur and trochanter, 200 ; tibia, 132 ; tarsus, 72 ; claw, 28. Hab.—On *Amelanchier*, Steamboat Springs, Colorado.

Aspidiotus Howardi, Ckll. (var. *ancylus ?)*, on ash *(Fraxinus)*, Denver, Col., July 28, 1902. The scales on the under side of leaf (along the mid-rib) are very pale, while those on the upper side are dark. The leaf on both sides along the mid-rib is faded to a light yellow, due from the infestation.

These were sent to Prof. Cockerell by Prof. Gillette, of the Agricultural Experiment Station, Fort Collins, Col. A single scale on currant twig, which proved to be *Eulecanium quercifex*, Fitch.

Phenacoccus Cockerelli, on service berry (Amelanchier), at Gunnison, Col.; coll. Prof. Ball, Sept. 20, '92. In some respects these differ from those secured from Prof. Gillette and described above. They are a little larger; when boiled in liquid potash, they turn to a deep bright claret colour. The females were filled with young larvæ, and this might account for the size. The insect is viviparous.

Pulvinaria innumerabilis, subsp., *Betheli*, n. subsp.— ♀ Scale dark brown, ovisac as in *innumerabilis*, cleared and pressed under cover glass 4 mm. in diameter. Derm practically colourless, slightly tinged with yellow. Antennæ 8-jointed ; measurements are, in μ :

Joints	1	2	3	4	5	6	7	8
	68	56	80	72	44	28	52	44
	68	52	86	68	60	40	32	48

Front leg coxa, 120; femur and trochanter, 220; tibia, 160; tarsus, 92. Stigmatal spines thin, sharp, 24 μ long.

Hab.—On birch (*Betula*), in Colorado; collected by Prof. E. Bethel, sent to Prof. Cockerell by Prof. Gillette, who supposed them to be *P. betulæ*, Linn.-Signoret. In the antennæ it is near to *P. tiliæ*, King and Ckll., but this scale is much larger and of a different colour.

New Mexico.

These were sent by Prof. Cockerell in 1901:

Chionaspis pinifolii, Fitch., on *Pinus*, sp., at Arroyo Pecos, East Las Vegas, N. M.

Dactylopius gutieuezie, Ckll., on *Gutieuezia*, at Arroyo Pecos, East Las Vegas, N. M.; coll. Mrs. W. P. Cockerell.

Pseudolecanium Californicum, Ehrh., East Las Vegas, N. M.

Dactylopius pseudonifæ, Ckll., on house fern, East Las Vegas, N. M.

Orthezia occidentalis, Dougl.; alt., 8,000 feet above the sea level; Peulah sapello Canon, N. M.

Eulecanium pruinosum, var. *kermoides*, Tyrrell, 1896. This species was described in the Annual Report of the California Experiment Station, in 1896, by Miss M. W. Tyrrell, as *Lecanium pruinosum*, var. *kermoides*, found on oak in California. In Prof. Cockerell's Check List, p. 339, it is listed, and he states that he doubts if it belongs to *pruinosum*; in his first Supplement, p. 394, it is listed as a synonym of *quercitronis*. In October, 1902, he collected some scales infesting *Quercus Emoryi* (Emory's oak), at Las Vegas, Hot Springs, N. M., at about 7,000 feet alt.; examples of these he forwarded to me, and in his note accompanying them stated that he believed them to be *L. kermoides*. The ♀ scales are red-brown, kermes-like in shape, average size 3½ mm. in diameter and 3 mm. high. Antennæ 7-jointed; joint (1) 32, (2) 32, (3) 48, (4) 48, (5) 20, (6) 20, (7) 40; joints one and two are equal in most cases; three and four are equal, when not, joint four seems to be the longest; five and six are equal and shortest. Leg coxa, 96; femur and trochanter, 148; tibia, 100; tarsus, 68. The species in the antennæ comes near to *E. quercitronis*, Fitch. There is no doubt that *kermoides* is a distinct species. In a recent letter from Prof. Cockerell he says he believes Mr. Pergande holds that *kermoides* is a distinct species. It, however, belongs to a very puzzling group where the antennæ are very variable. In *quercitronis* I

have found joints 3 and 4 to be equal in length, sometimes 3 longer than 4, and again 4 would be longer than 3, and in one instance joint 3 was very long, 108 μ ; in this case joint 4 was only 24 μ long.

Pulvinaria innumerabilis, on *Aesculus octandra*, East Las Vegas, N. M., Oct. 14, 1902.

A NEW SAWFLY.

BY R. A. COOLEY, AGRICULTURAL COLLEGE, BOZEMAN, MONTANA.

The Sawfly here described is a common pest on the leaves of various species of *Populus* in Montana, and a Bulletin dealing with its life-history and economic significance is about to be published from the Montana Experiment Station. We give here an outline of its life-history, followed by descriptions of the two sexes.

The adults appear on the foliage in May and continue there for about eight weeks. The female deposits her eggs singly on the very young, tender leaves, and at the same time stings them in such a way as to cause the edge to fold under on the lower surface. The egg is found under the epidermis in the end of the fold nearer the petiole. One edge or both edges may be folded. The larva, at first, feeds in the fold, eating off the surface of the leaf, but later ventures out and eats holes in the leaves, always preserving the fold for a retreat. The cocoon is formed in the fold and drops to the earth with the leaf. This leaf, among the others on the ground, forms the hibernating place for the insect.

In this paper the writer has adopted the form of description used by Mr. C. L. Marlatt in his valuable "Revision of the Nematinæ of North America."

Pontania Bozemani, n. sp.—*Female.*—Length 6 mm.; robust; emargination of clypeus a semicircle; lobes of the clypeus rounded; longest hairs of the mouth-parts about as long as the distance from lobe to lobe of the clypeus; lateral furrows of the vertex broad and rather shallow; ocellar basin distinctly defined; frontal crest almost absent; antennæ moderately slender, 4 mm. long, with joints 3 and 4 subequal, joint 5 shorter, joints 6, 7, 8 and 9 still shorter and subequal in length; sheath acuminate, hairy below at the apex; claws cleft for one-third their length. Colours principally resinous-yellow and black; antennæ, large spot on vertex, thorax above except sides of pronotum, dorsum of first abdominal segment, most of dorsum of second and spot on the next four

or five segments, glossy black; spot under base of wings, spot at base of posterior coxa, black; remainder of body resinous-yellow, except the sheath, which is very dark, around the mouth-parts, which is very light, and the posterior tarsi, which are darker above. Stigma light at base; veins brownish, lighter at base of wings. Wings iridescent.

Male.—Length 5.75 mm. Differs from the female in being less robust, in having the clypeus more widely excavated, in having the entire dorsal surface of the abdomen back to genital parts glossy black, and in having a larger spot of black at base of posterior coxa.

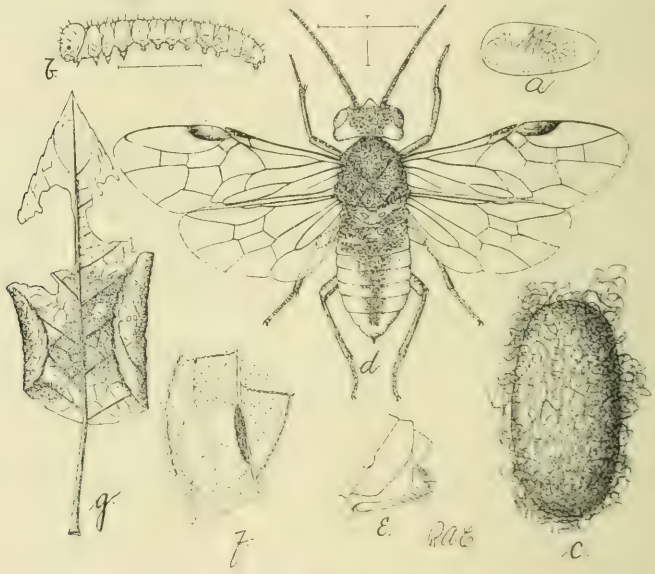


Fig. 6.

Explanation of Figures.

a.—Egg, showing the nearly mature embryo.
b.—Larva.
c.—Cocoon.
d.—Adult female sawfly.
e.—Side view of extremity of abdomen of female.
f.—Egg-pocket under epidermis.
g.—Leaf affected by the species.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, A. M., SC. D., ASSISTANT CURATOR, DIVISION OF INSECTS, U. S. NATIONAL MUSEUM.

(Paper No. 15.—Continued from Vol. XXXV., p. 158.)

Family XLI.—Myrmosidæ.

1899. Myrmosidæ, Family, Ashmead; Journ. N. Y. Ent. Soc., VII., p. 49 and 52.

1903. Mullidæ, Famille *(partim)*, André; Wytsman's Gen. Ins. Fam. Mutillidæ.

This family, as here defined, is, I think, a *natural* one, although some of the genera have been placed previously, by different authors, in other families, with the *Scoliidæ*, *Myzinidæ*, *Mutillidæ*, etc.

The females in this family may always be easily recognized by the thorax, which is distinctly divided into *two* parts, while the males, except in three or four cases, are easily distinguished by the genitalia, the hypopygium terminating in a sharp aculeus, which curves upwards, as in males in the family *Myzinidæ*, with which they are often confused.

The males belonging to the genera *Myrmosa*, Latreille; *Ephutomma*, Ashmead, and *Myrmosida*, Smith, have, however, the hypopygium unarmed, while in the South American genus, *Bradynobænus*, Spinola, it is tridentate, as in some *Thynnidæ*.

The venation of the front wings in all of these genera is, however, distinctive, and no difficulty will attend their recognition, as besides venation there are other characters.

The genus *Myrmosida*, Smith, I know only from the description and figure; it appears to approach nearest to *Apterogyna*, Latreille, although the hypopygium is apparently unarmed. It also resembles a male ant of the family *Poneridæ*, and particularly to males in the subfamily *Pseudomyrminæ*; if it is not an ant, then it is a Myrmosid, and it is placed in the subfamily *Apterogyninæ* provisionally.

Three distinct subfamilies may be recognized, one, the *Apterogyninæ*, first pointed out by Mr. Ernest André, as follows:

Table of Subfamilies.

Abdomen normal, *without* a constriction between segments 2 and 3, at most with a constriction between segments 1 and 2 . . . . . 2.

Abdomen *with* a strong constriction between segments 2 and 3, the first two segments being more or less nodiform.....3.

2. Thorax in female almost round, not or hardly longer than wide; head quadrate; mandibles falcate; maxillary palpi 3-jointed; labial palpi 2-jointed; *males* winged, the front wings *without* a marginal and a discoidal cell; hypopygium at apex tridentate.....Subfamily I.—Bradynobaeninæ.

Thorax in female not nearly round, much longer than wide; head variable, the maxillary palpi more than 3-jointed, the labial palpi more than 2-jointed; *males* winged, the front wings *with* a marginal and a discoidal cell; hypopygium ending in a single aculeus, which curves upwards, rarely unarmed.....Subfamily II.—Myrmosinæ.

3. Front wings in males (except in *Myrmosida*, Smith, which has a marginal cell and two cubital cells) *without* marginal and discoidal cells; hypopygium, except in *Myrmosida*, Smith, ending in a single upward curved aculeus; females readily known by the constriction between segments 2 and 3. Subfamily III.—Apterogyninæ.

Subfamily I.—Bradynobaeninæ.

This subfamily, so far as the characters of the males are concerned, approaches nearest to the *Thynnidæ*, the hypopygium being tridentate, much as in *Thynnus*, Fabr. but the venation is quite different.

The marginal and the discoidal cells are absent, and thus show an affinity with the *Apterogyninæ*. The female, however, is quite different from any in either the *Myrmosinæ* or the *Apterogyninæ*, the thorax being very short in outline, almost round, while the head is quadrate, the mandibles falcate, the maxillary palpi 3-jointed, the labial palpi 2 jointed. Only one genus is known:

Female, wingless.....1.

Male, winged.....2.

1. Thorax in outline almost round; head quadrate; mandibles falcate.....Bradynobaenus, Spinola. (Type B. Gayi, Spin.)

2. Front wings without a marginal cell, the discoidal cells wanting; hypopygium tridentate.....Bradynobaenus, Spinola

Subfamily II.—Myrmosinæ.

1896. Myrmosini, Tribe I. *(partim)*, Ashmead; Trans. Am. Ent. Soc., XXII., p. 180.

1903. Methocinæ, Subfamily *(partim)*, André; Wytsman's Gen. Ins. Fam., Mutillidæ, p. 6.

1903. Myrmosinæ, Subfamily *(partim)*, André; Opus. Cit, p. 12.

1903. Mutillinæ, Subfamily *(partim)*, André; Opus. Cit., p. 13.

To this subfamily belong the majority of the known genera and species falling in the family *Myrmosidæ*. It is easily separated from the *Bradynobaeninæ* by the shape of the thorax in the females and by the armature and venation of the males. The group comes closest to André's subfamily *Apterogyninæ*, but may be easily distinguished from it by the absence of a strong constriction between the second and third abdominal segments, and by the totally different venation of the front wings.

Two distinct tribes may be recognized as follows:

Table of Tribes.

Females ..... 1.
Males ..... 2.

1. Ocelli present ..... Tribe I.—Myrmosini.
   Ocelli absent ..... Tribe II.—Chyphotini.
2. Front wings with the marginal cell long, or not especially short; hypopygium unarmed ..... Tribe I.—Myrmosini.
   Front wings with the marginal cell usually short; hypopygium armed with an aculeus which curves upwards .... Tribe II.—Chyphotini.

Tribe I.—Myrmosini.

The females in this tribe resemble those belonging to the family *Mutillidæ*, but are easily recognized by having the thorax divided into *two* distinct divisions, and from the tribe *Chyphotini* by having *distinct* ocelli.

The males are easily distinguished by having the hypopygium *unarmed.*

Table of Genera.

Females ..... 1.
Males ..... 2.

1. Thorax quadrangular, the pronotum as wide as the meso-metathorax, usually rugoso-punctate, or coarsely punctate; maxillary palpi 6-jointed, labial palpi 4-jointed ..... Myrmosa, Latreille.
   (Type Mutilla melanocephala, Fabr.)
   Thorax not quadrangular, compressed at the sides from the meso-metathoracic angles; mandibles strongly excised beneath, with a projection towards base ..... Ephutomma, Ashmead.
   (Type Mutilla incerta, Radoszk.)

2. Marginal cell long; *four* cubital cells, the second and third each receiving a recurrent nervure.....Myrmosa, Latreille.
Marginal cell shorter, triangular; *three* cubital cells, the second triangular, receiving the first recurrent nervure near its middle, the third hexagonal; eyes large, extending to the base of the mandibles, emarginate within.....Ephutomma, Ashmead.

Tribe II.—Chyphotini.

1896. Chyphotini, Tribe III., Ashmead; Trans. Am. Ent. Soc., XXII., p. 179 (Cyphotini).

1903. Methocinæ, Subfamille, André; Wytsman's Gen. Ins. Fam., Mutillidæ, p. 6.

The absence of ocelli in the females and the armed hypopygium in the males, which terminates in a single aculeus that curves upwards, as in males in the family *Myzinidæ*, readily separate this tribe from the *Myrmosini*.

Table of Genera.

Females.....1.
Males.....4.

1. Thorax not quadrate, quite differently formed.....2.
Thorax quadrate, the sides parallel.
Head large, quadrate, wider than the thorax; mandibles long, at apex bidentate, sinuate or subemarginate beneath; pygidium with a pygidial area.....Brachycistis, Fox.
(Type B. petiolatus, Fox.)

2. Eyes round or nearly; abdomen petiolate or subpetiolate.....3.
Eyes oval, slightly sinuate on outer margin superiorly; abdomen nearly sessile.
Pronotum transverse, a little wider than the meso-metathorax anteriorly, but not wider than the same posteriorly, the sides being compressed just behind the pronotum (?). Milluta, André.

3. Abdomen subpetiolate, the petiole broadened towards the apex and constricted before uniting with the second segment; pronotum large, nearly obtrapezoidal, and fully as wide as the meso-metathorax, or a little wider.....Typhoctes, Ashmead.
(Type Mutilla peculiaris, Cresson.)
Abdomen with a distinct slender petiole; pronotum campanulate, much narrower than the meso-metathorax.....Chyphotes, Blake.
(Type C. elevatus, Blake.)

4. Middle tibiæ with *one* apical spur.....5.
   Middle tibiæ with *two* apical spurs.....7.
5. Front wings with *three* cubital cells, the second and third each receiving a recurrent nervure.
   Cubitus in hind wings originating much *before* the transverse cubitus; second cubital cell in front wings *not* triangular, very large, trapezoidal, not much larger than the third; submedian and median cells equal, the transverse median nervure interstitial with the basal vein; mandibles bidentate.....6.
   Cubitus in hind wings interstitial or nearly with the transverse cubitus, sometimes originating a little beyond it; second cubital cell in front wings more or less triangular; submedian cell usually a little longer than the median (rarely equal in some *Brachycistis*), the transverse median nervure usually not interstitial with the basal vein; mandibles bidentate.
      Marginal cell very short, always much shorter than the oblong stigma; first abscissa of the radius only about one-third the length of the third cubital cell; second cubital cell triangular, usually receiving the first recurrent nervure *before* the middle, not, or rarely, longer than the third; abdomen with a more or less distinct constriction between the first and second segments; scutellum rounded, subconvex; ocelli large.....Brachycistis, Fox.
      Marginal cell not short, about as long as the large oblong stigma; first abscissa of the radius as long, or nearly, as the third cubital cell; second cubital cell at least three times as long as the third, receiving the first recurrent nervure *beyond* the middle; third cubital cell quadrate, or nearly, a little wider (higher) than long, receiving the second recurrent a little before its middle; scutellum quadrate; ocelli large, the laterals about their width from the eye margin.....Milluta, André.*
      (Type M. chobauti, André.)
6. Marginal cell much longer than the large oblong stigma; lanceolate; first abscissa of the radius short, less than one-third the length of the third cubital cell; third cubital cell large, much longer than

*I am greatly indebted to Mons. Ernest Andre, for the loan of the unique type of this genus.

wide, nearly trapezoidal, a little shorter than the second ; ocelli very large, the laterals close to the eye margin . . . Magrettina, Ashmead. (Type Meria nocturna, Morowitz.)

7. Front wings with *three* cubital cells . . . . . 8.
   Front wings with *two* cubital cells . . . . . 9.
8. Second cubital cell receiving both recurrent nervures ; the third cubital quadrangular . . . . . Chyphotes, Blake.
9. *Two* recurrent nervures, the second cubital cell receiving both recurrent nervures . . . . . Chyphotes, Blake.
   Only *one* recurrent nervure received by the second cubital cell, the second recurrent nervure always wholly absent . . Typhoctes, Ashm.

SUBFAMILY III.—Apterogyninæ.

1899. Apterogyninæ, Tribu II., André ; Spec., des Hym., d'Eur. et d'Algerie, Tome 8, pp. 57 and 65.

This group was first recognized by Mr. Ernest André. It is a singular group, of small extent, falling naturally in the family *Myrmosidæ*, and not in the family *Mutillidæ*, where André placed it. Only about a dozen species are known, and none have yet been found in America, although species are found in Europe, Africa and Asia. The group should, however, occur in South America, and probably has representatives there still undiscovered.

In having a strong constriction between the second and third abdominal segments the species resemble certain ants in the family *Poneridæ*, and particularly those in the subfamily *Pseudomyrminæ*, the genus *Myrmosida*, Smith, being strikingly similar to a male ant of this subfamily. I know it, however, only from the description and figure. Smith placed it in the family *Mutillidæ*, but if it is a parasitic wasp and not an ant, then, on account of its abdominal peculiarities, it belongs here. Smith says nothing about the genital armature.

Table of Genera.

Males . . . . . 1.
Females . . . . . 2.

1. Front wings *with* a stigma, a marginal cell, two cubital cells and one discoidal cell ; head large, obtrapezoidal ; pronotum short transverse ; hypopygium (?) unarmed (Tribe I., Myrmosidini), (Singapore) . . . . . Myrmosida, Smith. (Type M. paradoxa, Smith.)

   Front wings *without* a stigma or a marginal cell, and usually without a cubital cell ; one small discoidal cell ; pronotum not short,

transverse quadrate ; hypopygium armed with an upward curved aculeus (Tribe II., Apterogynini), (Europe, Africa and Asia).....Apterogyna, Latreille. (Type A. Olivieri, Latr.)

2. Abdomen with the first two segments nodiform ; mandible narrowed, arcuate, pointed at apex.....Apterogyna, Latreille.

GYNANDROMORPHISM IN LUCANUS ELAPHUS.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Some time ago, while in St. Louis, I called on Dr. Geo. W. Bock, and saw in his collection a remarkable specimen of a female *Lucanus elaphus*, from Poplar Bluff, Mo. On my expressing interest in the matter, the Doctor very kindly gave me the insect, and I wish to put the case on record.

The chief organ affected is the left mandible (fig. 7 *a*), which is more than twice the length of the right (fig. 7 *b*), and partakes of many characters usually exhibited by the male. It is irregularly curved in outline, sparsely punctured, except at the base, where two elongate areas are coarsely and closely punctate, the larger area being on the superior face, while the smaller is lateral. The external face is flattened, trituberculate along the middle region, carinate along the upper and lower margins. The armature of the mandible is as follows : Subbasal and subapical teeth long, as in the male, the smaller intermediate teeth arranged not in one series, but in two, the lower row containing three denticles, one in front of and one behind (but below) the subbasal tooth, the other behind the subapical one ; the upper series consists of five teeth forming a row, as shown in the figure, the second being bifurcate at tip. The antennæ are not affected. The head is roughly punctured, somewhat uneven, but without the characteristic ridges of the male. The prothorax is not quite alike on both sides, the left being a little longer and showing a tendency to develop the shape of the male. The front tibiæ differ from each other, the left being a little narrower than the right, the apical tooth shorter and less excurved, the subapical trifurcate, the two teeth near the middle of the tibia crowded close together. The right middle tibia has four teeth (exclusive of those around the apex), while the left has but two. The hind tibiæ are practically alike.

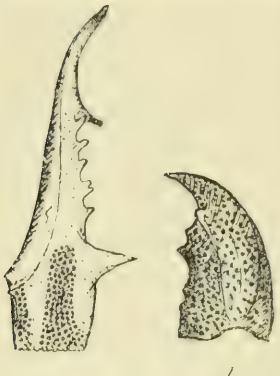


Fig. 7.

This is a curious case, showing an incomplete copying of the male characters, accompanied by considerable distortion. None of the organs affected are perfect images of their counterparts in the male, though the left mandible is sufficiently near to suggest that sex at once.

The figures will show the mandibles from above, the left on account of the downward curve of the tip, appearing shorter in proportion than it should, and, owing to their position, the lower series of teeth is not shown.

COLOUR-BLINDNESS AMONG ENTOMOLOGISTS.

BY PROF. C. H. FERNALD, AMHERST, MASS.

It is well known that a small percentage of the people in this country, and perhaps in all countries, are more or less colour-blind, and it is a noteworthy fact that such persons are often entirely unconscious of it or do not fully appreciate its disadvantages. The officials of the railroads and certain other corporations test the applicants for situations, and if they are found to be colour-blind, or not able to distinguish colours accurately, they are not employed. It will be readily seen that if a railroad engineer or the officer of the deck on one of our large passenger ships could not distinguish between red and green signal lights in the night, most disastrous accidents might be the result.

An entomologist might be more or less colour-blind on some colours and be entirely unconscious of the fact, but the results in his descriptive work would be faulty and more or less misleading, according to the degree of imperfection in his colour vision. A correspondent wrote me a short time ago that he had a larva which he called green, but his assistant declared it to be white. It is possible that if these gentlemen were tested, the colour vision of one or the other would be found more or less imperfect.

It is to prevent any possible errors in descriptive entomology because of colour-blindness that we have adopted the plan of testing all the graduate students in entomology in the Massachusetts Agricultural College.

MERISTIC VARIATION IN CORYDALIS CORNUTA, LINN.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Records of duplication of members in hexapod larvæ are so rare that I submit the subjoined account, drawn up from a specimen of the young of *Corydalis cornuta*, captured in the river near Iowa City, several years ago. The insect is one of a number that I took for class dissection, and as far as noted, the remainder did not depart from the ordinary type. A notice of the case was prepared at the time and sent to a scientific journal on the eve of its suspending publication, so that I think the article was never printed.

The larva under discussion measures, in its preserved state, about an inch and three-quarters in length. The duplication of parts concerns the left hind leg, where the femur, which is normal, bears a bifurcate tibia, one branch of which is longer than the other. The longer side attains a length about equal to that of the right tibia, and bears a tarsus which is approximately normal, though the claws are nearer together than usual; the shorter side of the tibia supports a tarsus, which in its turn shows a decided tendency to bifurcation and carries two pairs of claws.

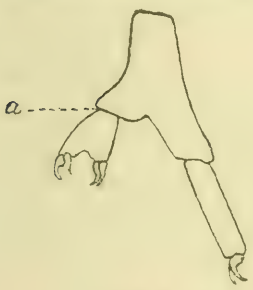


Fig. 8.

The proportions of the parts are shown in the figure. (Fig. 8.) I am not certain that the short tarsus is drawn in proper perspective, as I accidentally broke it off at the joint marked *a* in the figure, and may have twisted it in replacing. The specimen is preserved in my collection.

PREOCCUPIED NAME.

I refer to Prof. Fernald's kind notice of my "Hawk Moths," CAN. ENT., 98, 1887, for the statement that the generic term *Atreus* is preoccupied, having been used by Koch in 1837 for a genus of Scorpions. I should not have troubled myself further in the matter of changing this name in the Sphingidæ, seeing that Prof. Fernald believes a separate genus for *plebeia* from *Protoparce* unnecessary, except that Rothschild and Gordon, in their exhaustive revision of the Sphingidæ, just published, retain the name *Atreus* and criticise my calling the species "*plebeius*," instead of *plebeja*. So I change the name *Atreus*, Grote, 1886, to *Paratrea*, with *P. plebeja* as type. A. R. GROTE.

DO WE KNOW *CULEX CONSOBRINUS*, DESV.?

BY J. M. ALDRICH, MOSCOW, IDAHO.

Desvoidy published this species in 1827, in the Memoirs of the Society of Natural History of Paris, Vol. III., p. 408. The entire description is as follows:

"27. CULEX CONSOBRINUS, R. D.

Simillimus præcedenti; palpis, tarsisque bruneis.

Long. 3 lineas.

Omnino similis *Culici pipienti*: differt solum palpis tarsisque brunicosis, non flavis.

Habitat in Pennsylvania. (Musæum Dejeanianum.)"

The species preceding this, to which reference is made, is *Culex pipiens*; the length in that is also given as three lines. Nothing is said about the palpi and tarsi, further than the expression "pedes flavescentes."

This species remained unrecognized until 1896, when Coquillett, in Howard and Marlatt's Bulletin on "Household Insects" (Bull. 4, n. ser., Div. of Ent.), claimed to have identified it with a common and widespread form. He gave the following synonyms: *Punctor*, Kirby; *impatiens* and *pinguis*, Walker, and *inornatus*, Williston. The synonymy had been made out entirely from descriptions, save in the case of *inornatus*, of which Williston's type was in the National Museum for comparison. In Circular No. 40, Coquillett adds as probable synonyms, *Anopheles annulimanus*, Van der Wulp, and *Culex testaceus*, Van der Wulp.

Dr. Howard transmitted specimens of this supposed *consobrinus* to Theobald, who accepted them at their face value and redescribed the species in his Monograph of the Culicidæ, Vol. II., p. 78. He found from Kirby's type in the British Museum that *punctor* is a distinct species, which he redescribed on p. 75. As to Walker's species, he makes the following notes:

"*Culex impatiens*, Walker, may be this species (Coquillett's *consobrinus*), the type answering in nearly all respects, but the abdominal banding differs.

"*Culex pinguis*, Walker, may also be synonymous, but I do not know where the type is, and Walker's descriptions seem almost valueless, judging from the types I have seen."

Speaking of *Anopheles annulimanus*, Theobald says (1,213): "Coquillett thinks this species does not belong to the genus Anopheles at all. The description, he seems to think, applies to a male of *Culex consobrinus*, Desvoidy; but in this I can scarcely agree, and do not think such an authority as Van der Wulp would commit such an error."

As to *Culex testaceus*, Theobald received a specimen from Lake Simcoe, Ontario, which he identified as this species, making it distinct from the supposed *consobrinus*.

Now let us see whether the colour of the palpi and tarsi, as indicated by Desvoidy, is sufficient to distinguish a species from *pipiens*. Taking the full discussion of *pipiens* given by Theobald (Monogr., Vol. II., pp. 132–136), it is immediately seen that the female has "palpi thick, brown, with some grayish scales"; also "tarsi uniformly dark brown." In the male the palpi are "light ochraceous brown," and the "tarsi dark brown." Desvoidy's specimen was in all probability a female. It appears, therefore, that his distinctive characters are normal in *pipiens!* At any rate, *pipiens* is a variable species, and easily includes forms with all his characters.

The size given by Desvoidy is the same for both species, 3 lines. If I understand this correctly, it is about 6 mm. Theobald gives 4.5 to 5 mm. for *pipiens*, and 6 to 7 mm. for *consobrinus*. The advantage here is perhaps a little on the side of a distinct species; still, Desvoidy expressly makes it the same size as *pipiens*, which he speaks of as a very common species, so it works about as well one way as the other.

When I came to the conclusion, some time ago, that the real *consobrinus* is nothing but *pipiens*, which is known to occur in the United States as well as Europe, I wrote to Theobald and Coquillett in regard to the matter. The former replied that he had accepted the species on the supposition that Coquillett had examined the type of Desvoidy. The latter only wrote, "Repeated revisions of my first reference of *Culex consobrinus* have not caused me to change my opinion in regard to it. Size and colouring both apply better to this form than to *pipiens* or any of our other species."

I have shown exactly how much there is in the matter of "size and colouring."

The species which is now passing under the name of *consobrinus* I think should be known as *inornatus*, Williston. It was described in the Diptera of the Death Valley Expedition, North American Fauna, No. 7,

p. 253. The type of this description, as above stated, has been examined by Coquillett and found identical with the species under consideration. There is no other name which is not open to serious doubt.

Consobrinus, Desvoidy, may stand unidentified. Should anyone feel under necessity to "do something" with it, let him place it as a synonym of *pipiens*. Certainly no one can prove that it does not belong there, unless he can examine the type. In looking up Dejean's collection in Hagen's "Bibliotheca," I find considerable information as to certain families of Coleoptera and Lepidoptera, but nothing about the Diptera. The collection was divided, and the various parts scattered in a dozen places. So there is but little prospect that the type of *consobrinus* can be found.

The rapidly growing importance of the Culicidæ will, I trust, excuse me for occupying so much space in the attempt to set right one of our common species.

GOT WITHOUT SEEKING.

As I was sitting in Victoria Park, London, Ont., on one of the early days of August, 1902, a sharp click on my straw hat indicated to me that a beetle had been suddenly arrested in its erratic flight. I took off my hat and found thereon a longhorn, with the familiar outline and ornamentation of the old *Clytus* group. But there was something about it that seemed unusual to me, and the more I looked at it the more I was convinced of its novelty. So I secured it, killed and mounted it, and, as opportunity presented itself, endeavoured to determine it, but could find nothing with which it would correspond, and the books afforded me no relief. Having occasion to require the assistance of Mr. W. H. Harrington, Ottawa, upon some B. C. beetles, I sent my unique in order to secure his verdict upon it. He pronounced it to be *Xylotrechus 4-maculatus*, and remarked, "This is an interesting species, of which I have only taken one example, and that is of a yellowish colour." (Mine is whitish in the colour of its ornamentation.) "*4-maculatus* is said to be very variable in colour, so I think your specimen belongs to that species, although differing so much from mine." And that specimen now stands in what was before a blank in the Society's collection.

J. Alston Moffat.

Mailed June 30th, 1903.

The Canadian Entomologist.

Vol. XXXV. LONDON, AUGUST, 1903. No. 8

DESCRIPTION OF A NEW NORTH AMERICAN CULEX.

BY FRED. V. THEOBALD, M.A., BRITISH MUSEUM, LONDON, ENGLAND.

Amongst a number of Culicidæ sent me by Professor Kellogg from California, collected by himself and the students of Leland Stanford Junior University, is a very distinct new *Culex*, which is here described as *Culex Kelloggii*.

The collection contained several interesting species besides this one, including a new Anopheles, called by Professor Kellogg *Anopheles franciscanus*; specimens of the European *Theobaldia annulata*, Meigen, and the marked *Theobaldia incidens*, Thomson, and several others, which he will refer to elsewhere, including another new *Culex*. It may be here pointed out that Coquillett's *Culex Curriei*, now included in my new genus *Grabhamia*, is very closely allied to *Grabhamia dorsalis*, Mg. It is, however, a smaller and thicker-set insect, and has the last hind tarsus white. This collection also included a series of *Curriei*, as well as *Anopheles maculipennis*, Mg., and *A. punctipennis*, Say. The *A. maculipennis* are smaller than they usually occur in Europe.

Culex Kelloggii, nov. sp.—Thorax brown, with rich reddish-brown scales showing linear arrangement, two small pale spots, some rows of gray scales behind and on the scutellum. Proboscis black, with a white band. Abdomen black, with basal white bands and lateral spots. Legs black; femora pale at base, with a white line or row of spots, also the tibiæ, with a line of white spots. Metatarsi and tarsi showing apical and basal white banding; last hind tarsus with a black median band or all white. Wings unspotted.

♀.—Head brown, clothed with narrow-curved gray scales in the middle and behind, white ones forming a border around the eyes, brown ones between; at the sides small flat white scales, in the middle are numerous ochraceous upright forked scales, laterally the upright forked scales are black, two long brown bristles project forward between the eyes. Palpi black-scaled, with some large white scales at the apex, and some forming

a ring near the base; apex, etc., with a few dark bristles; proboscis black, with a prominent white band; antennæ black, basal and second joints dark, testaceous, the basal joint with white scales internally; clypeus brown. Thorax brownish-black, with rich reddish-brown narrow-curved scales, and a few broader gray ones at the sides in front, and some arranged in lines behind the mesonotum, on its surface are two small pale spots, two of the posterior white lines being continued back from them, two short, broader ones are situated in front of the bare space before the scutellum; the reddish-brown scales have a linear arrangement, due to two prominent median bare lines; bristles black; scutellum brown, with narrow-curved pale scales and brown border-bristles; metanotum deep brown; pleura brown, with some gray scales. Abdomen black, with basal white bands and white lateral spots and brown border-bristles; apex bristly; venter yellowish-brown, with scattered gray scales. Legs black, banded, striped and spotted in lines with white; base of femora gray to dull ochraceous, pale ventrally, with a row of white spots above, almost forming a white line; apex with a white spot; tibiæ also with a row of white spots, forming almost a line, apex white; fore and mid metatarsi and tarsi with narrow apical and basal yellowish bands, except the last tarsal segment; in the hind legs the metatarsi and tarsi have broad, almost white bands, the last tarsal in some specimens being almost all white; ungues equal and simple. Wings with the veins very densely scaled with typical brown Culex scales; those at the base of the third long vein thicker, forming a small, rather obscure, dark spot; first submarginal cell longer and considerably narrower than the second posterior cell, its base slightly nearer the base of the wing, its stem about one-third of the length of the cell; stem of the second posterior cell about two-thirds the length of the cell; posterior cross-vein not quite its own length distant from the mid cross-vein; fringe dark brown; halteres testaceous, knob darkened.

Length.—5 to 5.5 mm.

♂.—Palpi brown, the last two joints nearly as long as the ante-penultimate, the penultimate slightly shorter than the apical; the last two joints with long brown hairs on each side, also on one side of the apex of ante-penultimate joint; there is a narrow pale band at the base of the last two joints and also near the base of the long ante-penultimate joint; proboscis black, with a narrow white band on the base of the apical half; antennæ banded black and white, with flaxen plume-hairs. The head with

more gray scales than in the ♀. Thorax and abdomen as in the ♀. Legs as in the ♀; ungues of the fore and mid legs unequal, both uniserrated, of the hind legs equal and simple. Wings narrow; the fork-cells short; the first submarginal longer and narrower than the second posterior, its stem more than half the length of the cell; stem of the second posterior as long as the cell; posterior cross-vein about its own length distant from the mid cross-vein.

Length.—5 to 5.5 mm.

Habitat.—Stanford University, California.

Time of Capture.—September and October.

Observations.—Described from a series of 5 ♀s and 4 ♂s sent me by Professor Kellogg. It is a very marked species, but presents at first sight a resemblance to *Culex tæniorhynchus*, Wiedemann. It differs, however, in (1) having the legs apically and basally pale banded, (2) in their being marked with lines or lines of spots, and (3) in the simple, not uniserrated, ungues in the ♀ (4), in the structure of the ♂ palpi, etc. Moreover, a hasty examination will show that this species is not nearly so compactly built as in *tæniorhynchus*. The specimens show some variation, both in regard to the thoracic adornment and in the leg ornamentation. One ♀ has no signs of the two small pale thoracic spots, and the last hind tarsal in one appears almost white, and in others the median dark band is very broad, making the tarsal segment almost all dark coloured.

PREOCCUPIED NAMES.

In the Trans. Amer. Ent. Soc., Vol. 29, No. 2, 1903, pp. 168–169, Mr. Chas. Robertson creates, among other new genera in the Megachilidæ, *Gnathodon* and *Ceratias*. Both names have been previously used:

Gnathodon, Rang., 1834—*Mollusca*.
Gnathodon, Gray, 1836—*Mollusca*.
Gnathodon, Jard., 1845—*Aves*.
Ceratias, Kröycov, 1845—*Pisces*.

E. S. G. Titus, Washington, D. C.

Corrigenda.—Page 191 (July Can. Ent.), fourth line from bottom, for *Eyrtominum* read *Cyrtomium*; and second line from bottom, for *trimula* read *tremula*.

A NEW CAPSID.

BY CHARLES STEVENSON, MONTREAL.*

Lygus Chagnoni, n. sp.—This species of the genus *Lygus* is of a form near to *L. pabulinus*, Linn., in appearance.

It is ovate, convex, bright green in living specimens, with irregular purplish-brown markings at the base of the membrane, smooth and without bristles, and a silky pubescence on the sides of the pronotum, which has an orange-yellow border next the head, shading backwards in narrow lines into the green coloration, so as to make the green appear in broad bands.

Head polished and uniformly orange-yellow. Eyes large and prominent, and of so dark a brown colour as to appear black.

Antennæ slender and long, brown, with shades of orange-yellow. Basal joint uniform yellow, second joint slightly thickens and becomes brown towards the tip, the remaining joints dark brown, becoming much darker towards the end of the last one, which is very dark.

Scutellum convex, smooth, and of a deeper green than the wings.

Wings uniformly green on the corium, clavus and cuneus, the membranes paler and somewhat transparent, with irregular purplish-brown markings. At the meeting of the corium, there is a purplish-brown V.

Abdomen pale apple-green, with marked silvery pubescence, in the form of dashes and dots at the joints, the genital pieces green, with slight rusty tinge on the margins.

Legs pale green, the coxa, trochanter, as also the mesoscutum, very pale, without any spots or markings.

Length to the end of abdomen, 4.0 mm.; to the tip of the membrane, 5.0 mm.; width of pronotum, 1.25 mm.

Described from three specimens, one caught by Mr. G. Chagnon, in Rouville Co., Que., 11th July, 1902, and two by myself on Montreal Island, 14th July, 1902.

I take pleasure in naming this species after my friend, Mr. G. Chagnon, as a slight token of my appreciation of his companionship in our collecting trips and his great assistance in the identification of species and in my entomological work generally.

*Read before a meeting of the Montreal Branch, Ent. Soc. of Ont., 9th February, 1903.

NOTES ON FIVE SPECIES OF MEGACHILE.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. M.

I have spent more time than I like to think about identifying bees of the genus *Megachile*, so I have no apology to make for offering some notes which will, I hope, make the process easier for others:

Megachile frugalis, Cresson.—This species was described from the male. I have before me a female collected by Dr. Davidson at Lancaster, California. It practically agrees with the description of *M. zaptlana*, Cresson, ♀, except that it has no lines of white pubescence on the thorax. *M. occidentalis*, Fox, ♀, is very similar, and has the lines of white pubescence, but it has a different clypeal margin, and the very scanty hair on the disc of the clypeus is white. In *M. frugalis*, ♀, the clypeus has long black hair; the ventral scopa is creamy white, black on the last segment. These bees are all of the elongate narrow type. The anterior margin of the clypeus in *frugalis*, ♀, can hardly be called excavated, but presents three gently-rounded prominences, the margin between them being slightly concave.

Megachile montivaga, Cresson.—At flowers of *Tourrea decapetala* (Sims), Raton, N. M., Aug. 27, one ♀ (W. P. Cockerell). Length nearly 14 millim. An Illinois sample is smaller (about 12½ millim.), and has the thorax more densely punctured. The species resembles *M. relativa*, Cr., but is larger and less shining, and the abdominal bands are pure white. A variety of *M. montivaga*, with more conspicuous black hair on the dark parts of the abdomen, was taken by Prof. Townsend at flowers of *Potentilla Thurberi*, on the Rio Ruidoso, N. M., about 6,500 ft., Aug. 1.

Megachile inimica, Cresson.—Las Vegas, N. M., one male at flowers of *Verbena Macdougali*, Aug. 9 (W. Porter). This is *Sayi*, Cresson, said by Robertson to be a synonym of *inimica*. In our specimen the tegulæ are very dark brown. The insect has a long, narrow abdomen, and looks superficially like *M. occidentalis*, Fox. Upon closer study it is seen to be really nearer to *M. pugnata*, Say, from which it is easily distinguished by the hollow process on first tarsal joint being fringed along its whole length with dark fuscous hair; in *pugnata* the basal two-fifths is densely fringed with black hair, and the portion beyond has a short fuscous comb.

Megachile pruina, Smith.—Chaves, N. M., Aug. 6, two males (*Townsend*); Mesilla Park, N. M., one male at flowers of *Isocoma Wrightii*, Sept. 11 (*Porter* and *Cockerell*); near Los Angeles and

Catalina Island, California (*A. Davidson*). This gives the species a very wide range in the south-west, and while it must be confessed that the specimens are not all alike, I am unable to detect anything more than individual variation.

Megachile mendica, Cresson.— ♀. Length about 12–13½ millim.; abdomen shovel-shaped; ventral scopa orange, including last segment; white on basal half of second segment.

Gallinas River, at Las Valles, N M., Aug. 6 (*Porter* and *Cockerell*). Another is from flowers of *Verbascum thapsus*, Rio Ruidoso, White Mts., N. M., 6,900 ft., July 23 (*Townsend*). The scopa of the latter is full of orange pollen.

The New Mexico specimens agree with an Illinois ♀ from Robertson. *M. mendica* looks like a small *M. latimanus*, having the same form and general coloration. In *latimanus* the scutellum is covered with pale ochreous hair, and the mesothorax broadly bordered with the same, so that the black hair is confined to the central part. In *mendica* the light hair of the head and thorax is white, and the scutellum and mesothorax (except the margins of the latter narrowly) are thinly clothed with black hair. In both the thorax, though closely punctured, is shining. In *latimanus* the vertex is mostly, or wholly, clothed with pale hair, in *mendica* it is clothed with black. In both the basal joint of the hind tarsi is broad, and clothed on the inner side with orange hair. The mandibles are similar in both, except that they are less produced in *mendica*. In *mendica* the first recurrent nervure enters the second submarginal cell much further from its base than the second does from its apex; this is not usually the case in *latimanus*.

M. mendica resembles *M. relativa* in the colour and arrangement of the hair on the head and thorax, but *relativa* is a narrower bee, with a conspicuously narrower face. The abdominal bands in *relativa* are yellowish, in *mendica* they are white.

The Mediterranean Flour Moth, *Ephestia kuehniella*, has been sent to me recently from Seattle, Washington, and Honeoye Falls, N. Y. As far as I know, this is the first time the pest has been recorded from the State of Washington. I have specimens of matted flour and larvæ from Arthur, Ont., Canada. In each case reports are made that the insect is doing serious damage to the milling business by matting and clogging up spouts and elevators with flour. The moth seems to be slowly and steadily spreading over the U. S. and Canada.

W. G. Johnson, New York.

A NEW OAK-GALL.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. MEX.

Dryophanta rydbergiana, n. sp.—*Gall*: on leaf of *Quercus rydbergiana*, Ckll. (Torreya, Jan., 1903); solitary, 6 mm. diameter, spherical, faintly shiny, light ferruginous, with a microscopically tessellate surface and a scattered stellate pubescence; base concave, point of attachment small; contains a single large cell; the space between the cell and the exterior filled with spongy tissue, which is light green within and ferruginous outwardly.

Fly (cut from gall): ♀.—Body 2½ mm. long, stout, jet black, smooth, neither punctured nor conspicuously hairy; mesothorax and scutellum with a few scattered hairs; front and vertex minutely tessellate; no frontal groove; middle ocellus somewhat depressed; face without carinæ; malar space long, wrinkled; flagellum black, 12-jointed, the last five joints (at least) longitudinally grooved; whole flagellum hairy; first flagellar joint about one-fourth longer than second; basal joints of antennæ dark red; the small first joint punctate; the second much swollen. Parapsidal grooves deep and strong, complete, converging posteriorly; scutellum large and swollen, longitudinally keeled, with a depression on each side anteriorly; anterior margin of scutellum raised into a sharp edge; posterior part coarsely cancellate. Metathoracic ridges very widely divergent caudad. Legs red; tarsi hairy; claws of posterior legs simple; wings hyaline, not spotted, but hairy; veins strongly marked with dark brown; marginal vein not quite attaining costa; areolet present. Ovipositor black, concealed; ventral spine red, covered with long ferruginous hairs.

Hab.—Las Vegas Hot Springs, N. M., about 7,000 feet, March 21, 1903. The gall was on a leaf of last year, the leaves of *Q. rydbergiana* remaining on the bush, though turning brown.

This insect is placed in *Dryophanta*, because it seems on the whole to go there best, but it does not exactly agree with any described American genus. In Mayr's table, given by Cresson, it runs to *Biorhiza*, but it does not belong there. The gall is like that of *Amphibolips*.

CULEX CONSOBRINUS AGAIN.

BY D. W. COQUILLETT, WASHINGTON, D.C.

In the July number of the CANADIAN ENTOMOLOGIST, Prof. J. M. Aldrich attempted to rescue Dr. Williston's *Culex inornatus* from the synonymy by referring the true *Culex consobrinus*, Desvoidy, as a synonym of *Culex pipiens*, Linné, and denying that any of the other species which the writer originally placed in the synonymy of *consobrinus* is identical with *inornatus*.

Desvoidy did not give a separate description of his *consobrinus*, but compared it with what he identified as *pipiens*, observing that it differed in having the palpi and tarsi "brunicosis, non flavis." Desvoidy was noted for his erroneous identifications of previously described species, and that he mistook some larger species for the true *pipiens*, seems to admit of no doubt, since the measurement he gives, "long. 3 lineas," is too long for the latter, all the specimens of which in the National Museum fall short of 2.5 lines. His measurements are usually accurate, as may be gleaned from those he gave of such strongly-marked, easily-recognized forms as *Culex mosquito*, *Anopheles maculipennis*, *A. argyritarsis*, *Psorophora ciliata*, etc., all of which are within the range of the specimens of the given species. He gave the same measurement for *consobrinus* as for *pipiens*, and in deciding what species the former refers to it is necessary to find a species which is larger than the true *pipiens*, has the ground colour he gave for *pipiens*, "cinereo-subflavescens. Thorax, dorso-levitor fulvescente," and that inhabits Pennsylvania, the locality given for *consobrinus*. Up to the present time we know of *only one species* that fills all of these requirements, and this is the form which I have identified as *consobrinus*.

Even if I erred in this identification, there are still at least two other names that stand in the way of Dr. Williston's *Culex inornatus*, namely, *C. impatiens*, Walker, the type of which Mr. Theobald states agrees in nearly all respects with what I have identified as *consobrinus*, except in the abdominal banding, and this was not of sufficient importance to cause him to regard it as representing a distinct species; and *C. pinguis*, Walker, which Mr. Theobald admits may be synonymous with *consobrinus*.

As I hope to review this subject more at length in a forthcoming monograph, it need not be enlarged upon here; sufficient facts have been given above to fully disprove Mr. Aldrich's contention in relation to the true *Culex consobrinus* of Desvoidy.

A SUPPOSED MIGRATION OF PIERIDÆ WITNESSED IN VENEZUELA IN THE SUMMER OF 1901.

BY AUSTIN H. CLARK, HARVARD UNIVERSITY, CAMBRIDGE, MASS.

The erratic migrations of certain insects, often in countless swarms, have been noticed and put on record by many observers. In a country where, perhaps, they are scarce, or, it may be, almost wanting ordinarily, they may suddenly put in an appearance in such numbers as to defy all attempts at computation ; or immense swarms of them may sometimes be seen far out at sea, flying steadily in a direction which may take them out so far as to effectually prevent any return.

To show the frequency of this phenomenon, it is only necessary to mention a few cases. The best known, perhaps, or, at any rate, the most familiar, is that of the locust. Large areas of growing crops have been totally ruined and well-to-do people reduced to poverty through the sudden and wholly unexpected appearance of this unwelcome visitor. Many years may pass with no sign of these insects, and then they come, bringing destruction with them. Among the Neuroptera, the dragon-flies, especially the species *Æschna bonariensis* of southern South America, seem to be especially subject to these migrations. In these swarms, according to Hudson,* who studied them in the Argentine, all the larger species associate together, and universally fly down the wind, coming commonly from five to fifteen minutes before a burst of the cold, dry south-west "pampero." Weissenborn† describes a great migration of dragon-flies which he witnessed in Germany in the year 1839, and also mentions a similar phenomenon occurring in 1816, which extended over a large portion of Europe. But this habit seems to be of commonest occurrence among the Lepidoptera. Among others, Wallace mentions seeing a vast congregation of Pieridæ in the Indian Ocean, and Maynard a swarm of Danaidæ *(Anosia berenice)* off the coast of Florida. It is now recognized as a more or less regular proceeding on the part of some species or groups, especially among the Pieridæ, to congregate and perform long journeys without any apparent aim.

While approaching the coast of Venezuela in the month of June, 1901, I was struck by the numbers of Pieridæ passed, not in great swarms, but in numerous small loose bunches, which began to appear even before the mountainous coast could be well made out. All these insects were

*The Naturalist on the La Plata, Chapter IX.

†Loudon's Magazine of Natural History, N. S. III.

headed toward the north-east, directly against the trades. Although I was familiar with the fact that commonly the Pieridæ are the first butterflies with which one meets when approaching land, and had tested the truth of it while nearing the coast of Portugal, and also off the Azores, I did not suppose that they regularly occurred in such abundance as I found them here in the Caribbean. In fact, it had been my experience to only meet with a half-dozen or so when approaching land. But here the steamer continually passed by straggling bunches of them, all flying north-east, out to sea. As we neared the shore, they became more common, and when at last I landed and looked up on the mountain-side above La Guaira, there were thousands of them. The whole mountain-side was thickly dotted with specks of yellow and orange, which kept moving steadily on, in an easterly direction, rarely pausing, following, apparently, the line of the coast, and going in the same general direction from which came the trade winds.

On the next day, from the car window of the little train which runs from La Guaira to Caracas, over a roadbed from which are obtained glimpses of great gorges filled with tropical vegetation, as well as of the parched and barren mountain-sides, destitute of life save for a few gaunt post-cacti and scraggy thorn bushes, I saw thousands of butterflies of this group, all moving steadily, like the waters of a great river, toward the east. In many cases I thought I saw the insects flying in another direction. Often I was sure some were flying west, but on taking my bearings I invariably found that my calculations were at fault, and that all the butterflies were moving east. There is, perhaps, no railroad in the world on which a man is so often at a loss to know just where are the cardinal points of the compass. The sun gives no clue during the hotter hours, at the season when I was there, as it is practically in the middle of the sky; and the whole journey is simply a succession of curves, this way and that, so confusing that many times I could not realize the compass had not succeeded in some way in getting out of order and reversing, or at least seriously changing its position with respect to the magnetic pole. Over the mountain-sides and across the valleys Pieridæ could be seen, always near the ground, yet rarely alighting, and invariably travelling eastward.

While at Caracas I made many excursions into the surrounding country for butterflies, and from the hilltops there I could watch the steady migration, although here the numbers were very much less than at La Guaira.

On the way back to La Guaira, as well as while staying there, I made a careful study of the constituents of this vast throng. The most noticeable fact was that practically all were males. In fact, I saw but two or three females, and these were at a little roadside station, half way between the two towns. I am almost certain that these were not members of the general tide, for they were flitting, to all appearance, aimlessly about, and did not evince that peculiar haste to move onward so noticeable in the others.

During my stay at Caracas I collected a number of Pieridæ of several species, and of both sexes, in the meadows near the bank of the river which flows by the city. These seemed not to be affected by the general movement, and acted just as the members of the group ordinarily do.

The most abundant species by far, making up between one-half and three-quarters of the flight, was *Callidryas eubule*. Of the remainder, *Phœbis argante* was the commonest, with a close third in *Aphrissa statira*. Here and there could be seen *Callidryas philea*. Once or twice I thought I could make out *C. cipris*, but could not feel certain of the identification. I make no mention, of course, of others of the group, as *Pontia monuste* and *Gonepteryx clorinde*, which, though common, did not seem to take any part in the migration.

A few days later, while coasting along to the port of Carúpano, I continually saw the butterflies singly and in little bands out over the sea.

From Carúpano I went to the island of Margarita, where I stayed for over three weeks. Here it was a noticeable fact that all the Pieridæ were resident in the little grassy patches, in which they apparently had been bred and stayed all their lives; and here males and females were observed in normal proportions. Without doubt, the island was receiving its share of wanderers from the mainland, but those there showed no inclination to leave, and were never found outside of the restricted localities where they made their homes.

When I left the island I coasted along the shore as far as Trinidad (B. W. I.), but did not observe anything of the swarms I had seen near La Guaira; and it may be mentioned here that neither about Carúpano nor at any part of the coast were the insects found so abundantly as at and near La Guaira.

There are two possible explanations of the facts just stated: Either that this is the regular habit of these butterflies, to keep constantly moving eastward during the imago state, or that it was an unusual migration.

Further observation will prove which view is correct. But I have seen nothing to show that this is the ordinary mode of procedure for Pieridæ in this region; and from the immense numbers observed, it seems to me that it was one of those peculiar migrations to which this group seems to be particularly subject, started, perhaps, by some chance few down toward Puerto Cabello, or, it may be, as far as Coro, which picked up more and more as they went on, until when they arrived in the vicinity of La Guaira their numbers were beyond calculation, all the later additions to the multitude taking the same direction of flight as that adopted by the originators of the movement.

Perhaps the course taken was at first an expression of positive anemotaxis—a flight against the prevailing wind. But later the sense of direction seems to have become so firmly fixed that they moved east even when in the sheltered valleys or in gorges where the direction of the wind was changed.

This is, in brief, what it was my lot to witness while in Northern Venezuela; and it is much to be hoped that others who chance to be in that locality at some future date will make notes of their experiences with the butterflies mentioned, and prove conclusively whether this was a normal condition of affairs or an extraordinary chapter in the history of insect life in this region.

NEW APOIDEA FROM MONTANA.

BY AUSTIN W. MORRILL, PH. D., MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST, MASS.

Bombus Cooleyi, n. sp.—♀. Length, 16–17 mm. Integument black; clothing black, yellowish white, pale ochreous yellow and rusty yellow. Head, seen from in front, about as wide as long. Malar space about one-sixth the length of eye. Third segment of antenna one-half longer than fourth, and scarcely longer than fifth. Face thickly clothed with pale yellowish-white hair, on the sides mixed with black. Vertex clothed with yellowish-white hair, which is fringed in front with black. Cheeks clothed with brownish-black, sometimes slightly mixed with whitish, hair. Clypeus shining, sparsely punctured, labrum fringed on free edge with rusty yellow hair. Clothing of thorax above and on sides yellowish white, mixed with black in front of insertion of wings. A broad patch of black between the wings surrounds the smooth, polished mesothoracic disc and extends back in a point over the middle of metathorax. On each side of metathorax is a tuft of yellowish white hair.

On sides of propodæum the yellowish-white hair is more or less mixed with black. Coxæ, trochanters and bases of femora on inner side with whitish hair. Clothing of femora elsewhere brownish black. Corbiculæ rusty yellow. Integument of posterior tibiæ dark brown : of tarsi light yellowish-brown. Tarsi clothed with fine, bright yellowish-brown pubescence. Wings slightly stained with brown, nervures brown.

Dorsal surface of abdomen : First segment clothed on each side with a tuft of ochreous-yellow pubescence, the space between being bare, or nearly so ; second segment clothed with black, slightly mixed with yellowish, except apical sides, where pubescence is pale ochreous-yellow ; third segment clothed similarly to second segment, except on extreme sides, where the pubescence is also pale ochreous-yellow ; fourth segment entirely clothed with pale ochreous-yellow pubescence ; fifth segment clothed with black, more or less mixed with yellowish pubescence and with a yellowish fringe on apical margin ; sixth segment scantily clothed with short black and brownish hair, at apex, brownish, velvety. Ventral surface : Segments two, three, four and five are fringed apically with yellowish-white hair. Specimens from Prof. R. A. Cooley, taken at Middle Cr. Canon, Bridgen Canon and Bozeman (elev. 4,800 ft.), Montana, in June and July, 1899, and July, 1901, respectively.

Colour variety A. Differs from type only in following details of colour : clothing of second and third abdominal segments above, entirely black, except for a few yellow hairs on apical sides of third segment.

From Prof. R. A. Cooley, taken at Bridger Mt., Montana, elev. 6,000 ft., June, 1899.

Colour variety B. Differs from type only in colour of clothing of third abdominal segment above, which is entirely ochreous-yellow, except for a narrow band of black extending along the middle of the dorsum, from the anterior to posterior margin of the segment, and a few black hairs on the sides.

From Prof. R. A. Cooley, taken at Bozeman, Montana, elev. 4,800 ft., June, 1901.

Described from three ♀ specimens ; one, the type deposited in the collection of the Mass. Agric. College ; co-types deposited, one at the U. S. Nat. Museum and one in the collection of the Montana Agricultural College. Varieties A and B were described from one ♀ specimen of each, both in the collection of the Mass. Agric. College.

I take pleasure in naming this species after my friend, Prof. R. A. Cooley, of the Montana Agric. College.

Bombus atrifasciatus, n. sp.—♀. Length, 17½ mm. Black, clothed with unusually fine and long, black and pale yellowish-white hair. Head, seen from in front, considerably longer than broad.* Eyes comparatively small. Malar space about one-half the length of eye. Face broad. Third segment of antenna slightly longer than fifth; fifth a little longer than fourth. Clypeus strongly arched, shining, sparsely and rather coarsely punctured on sides. Labrum deeply cleft, sparsely clothed with brownish pubescence. Head clothed with brownish-black pubescence, mixed with whitish between bases of antennæ. Thorax clothed with pale yellowish-white pubescence, except a broad oval band of black between the wings. Coxæ, trochanters and bases of femora of first and second pairs of legs clothed with whitish pubescence; femora elsewhere than at base, tibiæ and tarsi clothed with reddish brown pubescence. Coxæ, trochanters and femora of third pair of legs clothed with long yellowish-white hair; corbiculæ rusty yellow, inner side of first tarsal segment light brown, hind tarsi elsewhere clothed with very fine yellowish pubescence. Integument of legs brownish black. Wings stained with brown, nervures dark brown. Abdomen rather robust. Dorsal surface: segments one, two, four and five clothed with pale yellowish-white pubescence; extreme sides and lateral portions of the posterior margin of segment three clothed with pale yellowish white, remainder of three clothed with brownish-black pubescence; segment six sparsely clothed with short brownish yellow pubescence, velvety at apex. Ventral surface: segments two, three, four and five are fringed apically with pale yellowish-white hairs, much longer on sides than in the middle; segment six clothed at apex with brownish-yellow, velvety pubescence.

Described from one ♀ specimen from Prof. R. A. Cooley, taken at Gallatin Co., Montana, elev. 9,400 ft., collected in July, 1900. Deposited in collection of Mass. Agric. College.

Psithyrus latitarsus, n. sp.—♀. Length 19–20 mm. Integument black, clothing black and yellow. Head seen from in front, a little longer than broad. Malar space about one-fourth the length of eye. Clypeus punctate. Third and fifth segments of antenna subequal, fourth segment about two-thirds as long as third. Clothing of head black, slightly mixed with yellow on vertex. Clothing of thorax brownish-yellow, except a narrow band of black between the wings and a little black on sides of

*In the type, the length of the head, measured from vertex to base of the labrum, is 6 mm.; breadth 5 mm.

propodæum. Wings subhyaline, smoky brown, nervures brown. Legs, except tarsi, clothed with black and brownish-black pubescence. First tarsal segments clothed with brownish-black, except inner sides and tips, which with the four following tarsal segments are clothed with brownish-yellow pubescence, darkest on inner side of first tarsal segments. Length of metatarsus about two and one-half times its greatest width, posterior edge strongly arcuated.

Dorsal surface of abdomen : Clothing sparse and short ; black and pale lemon-yellow, the hair of the former colour usually tipped with brownish or yellowish, more noticeable on posterior margins of the segments. Pubescence on first segment black, sometimes mixed with yellow on the sides ; on second segment black ; on third segment black, with more or less yellow on sides posteriorly ; on fourth segment entirely yellow, except for a patch of black on middle of basal half, which may or may not extend in a point to apex of segment ; on fifth segment black except extreme sides, which are yellow ; terminal segment naked except for a very fine brownish velvet-like pubescence below and on sides above ventral surface of abdomen ; segments one to five have an apical fringe of black hairs. From each side of apical segment below arises an angular, keel-like process, which is directed outwards and downwards, the two converging posteriorly, becoming less pronounced, and disappear near the tip of the segment. From above these keel-like processes can be plainly seen extending outwardly from the sides of the apical segment.

Described from nine ♀ specimens from Prof. R. A. Cooley, taken at Gallatin Co., and Bozeman, Montana. Type deposited in collection of Mass. Agric. College. Co-types at Mass. Agric. College, U. S. Nat. Museum, and at Montana Agric. College.

This species in colour, general form and size resembles *P. insularis*, Smith ; but the two cannot be even closely related, as will be seen from the following partial description of the latter species :

Malar space about one-third length of eye. A tuft of yellow on head just above insertion of antennæ, another on vertex, and sometimes a very small one between insertion of antennæ—all fringed with black. Metatarsus about three times as long as its greatest breadth, posterior margin nearly straight. Apical segment of abdomen below with a simple rounded swelling on each side, not projecting enough to be noticed from above.

I have examined thirteen ♀ specimens of *P. insularis* from Montana and one from New Hampshire (Durham), all of which agree with Smith's

description of the species. One of these specimens was sent to Washington, D. C., where it was compared by Mr. Ashmead with a specimen of *P. insularis*, determined by Cresson, and was found to agree.

P. latitarsus, n. sp., also resembles *P. campestris* of Europe in colour, but can be readily separated from it by the broader metatarsus and the structure of the ventral side of the terminal abdominal segment.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 9.—*Psithyrus latitarsus*, n. sp.; side view of terminal segment of abdomen.

Fig. 10.—*Psithyrus insularis*, Smith; side view of terminal segment of abdomen.

Fig. 11.—*Psithyrus latitarsus*, n. sp.; tarsal segments of left hind leg.

Fig. 12.—*Psithyrus insularis*, Smith; tarsal segments of left hind leg.

SOME NEW NORTH AMERICAN HOMOPTERA.

BY E. B. BALL, AG. COLLEGE, LOGAN, UTAH.

Phlepsius collitus, n. sp.—Resembling *fulvidorsum*, but smaller and paler. Colour fulvous, elytra brown, with two imperfect light bands. Length, ♀, 6 mm.; width 2 mm. Vertex short, obtusely rounded, but little longer on middle than against eye, three times wider than long; disc convex; the anterior margin distinct, but not sharply angled; elytra rather long and narrow; venation distinct, claval veins separate, parallel. Colour: vertex fulvous, sometimes with faint brownish mottling; face uniform dull brown; pronotum fulvous, usually mottled with brown on the disc; scutellum fulvous. Elytra pale, heavily inscribed with brown, omitting three spots on the sutural margin, an oblong area just inside the costa on the apical half, and a pair of oblique bands starting from the first and last sutural spots, which are milky white. In the lightest specimens the brown tends to run together into dark blotches on the costa and between the white spots on the suture. Genitalia, female segment twice the length of the penultimate, the lateral angles obtuse, the posterior margin roundingly produced on the median third, and strongly notched in the middle. Disc of the segment fulvous, the posterior margin on each side of the slit black, the lateral angles light.

Described from three females from Ames, Iowa. This species has long been confused with *fulvidorsum*, but is readily distinguished by the shorter head and distinct genitalia.

Phlepsius lippulus, n. sp.—Form of *fulvidorsum* nearly, but slightly smaller, and with a shorter vertex. Colour milky white, with three brown bands. Length 5.5 mm.; width 1.75 mm. Vertex nearly right-angled, one-third longer on middle than against the eye, twice wider than long, acutely angled with front, the margin distinct, except near the eyes. Front rather narrow, margins straight. Pronotum long, strongly angled in front, disc convex in both diameters. Elytra rather narrow, the venation obscure. Colour: vertex pale orange, an ivory white median line on tip, with a pair of oval brownish spots adjoining it, and a pair of black dots on the margin, nearly half way to the eyes. Face pale, slightly and evenly irrorate with fulvous brown. Pronotum fulvous brown; the anterior submargin white. Scutellum fulvous brown; the oblique margins light, interrupted with a pair of black spots. Elytra milky white, a transverse fulvous brown band across the middle of clavus, another just back of clavus and a narrow apical margin of brown. The second band

forks on the middle of corium, and begins and ends in dark spots on the margin. A round black dot in the middle of the anterior milky band against the claval suture. Genitalia: female segment moderately long, half longer than the penultimate; posterior margin nearly straight, slightly roundingly produced on the median half.

Described from two female specimens from Biscayne Bay, Fla., collected by Mrs. Annie T. Slosson. This is a beautiful and strikingly distinct species. The milky-white elytra with the distinct brown bands will readily separate it from any other broad-headed species.

Phlepsius pauperculus, n. sp.—Resembling *albidus*, but smaller and with a sharper vertex. Colour pale greenish-white; elytra faintly fuscous marked. Length 3 mm.; width less than 1 mm. Vertex nearly as long as pronotum, half wider than long, nearly right-angled before; disc flat; anterior margin thick, slightly acutely angled with face. Face strongly convex in profile; pronotum short, wrinkled, depressed just back of the anterior margin. Elytra short, broad; venation indistinct. Colour: pale greenish-white. Vertex sometimes pale yellowish-white. Elytra pruinose, white or greenish-white, with a very few fuscous dots. Face and beneath pale greenish-white. Genitalia: female segment rather long, over twice the width of the penultimate; posterior margin nearly straight, the lateral angles rounding; median fourth slightly produced and faintly notched.

Described from three specimens taken at Grand Junction, Colo., by E. P. Van Duzee and the author.

Phlepsius Franconiana, n. sp.—Resembling *Uhleri*, but larger, with a more acutely angled vertex and a narrower head. Length, ♂, 5 mm.; width 1.4 mm. Vertex sloping in same plane as pronotum, slightly transversely depressed, subangulate, with the margins distinct; margins subparallel. Face as in *P. strobi*, the front slightly more flaring above and with the base angled instead of rounding. Pronotum truncate, or very slightly emarginate, its anterior margin strongly curved. Colour: vertex and pronotum fawn colour, with light mottling. Scutellum testaceous, with four white points in a triangle at apex. Elytra brown, with brownish fuscous irrorations and reticulations, a broad, light band just back of scutellum, a narrow line just before the apex of clavus, and an irregular one just before the apex. The bands are strictly transverse, and the middle one is slightly narrower than the brown one in front of it. The reticulations are continued across the light areas. Face fawn colour, with

fuscous irrorations and a white mark just under the apex of vertex. Eyes red. Genitalia: male valve triangular, two-thirds the length of the ultimate segment; plates long, triangular, their margins straight; apices acute, two and one-half times the length of the valve, slightly exceeded by the pygofers. The margins clothed with fine silky hairs, submargins with coarse bristles arising from black spots.

Described from one male from Franconia, New Hampshire, taken by Mrs. Annie T. Slosson, and kindly sent me by Mr. Van Duzee.

Thamnotettix waldana, n. sp.—Form and general appearance of *montana* nearly, slightly larger and lacking the white markings of that species. Testaceous brown; the vertex and margins of elytra pale. Length, ♀, 5.5 mm.; ♂, 5 mm. Vertex transversely depressed, one-fourth longer on middle than against the eye, over twice wider than long, broadly and evenly rounding to the front. Pronotum twice longer than the vertex, rugose on the anterior submargin. Elytra rather long, narrow and closely folded behind; venation distinct, similar to that of *belli*.

Colour rusty brown; the vertex pale yellow, with a trace of rusty brown near base, sometimes forming a tranverse band in the male; the tips of the claval nervures and the costal margin of the elytra, from before the middle to just before the tip, white. Face and below varying from pale to nearly all fuscous. Genitalia: female segment rather long, truncate, with a broad triangular notch containing a strap-shaped tooth as long as the segment. Male valve short, obtusely rounding; plates three times as long as valve, rather long, spoon-shaped, the margins clothed with long hairs.

Described from sixteen specimens taken in North Park and Rico, Colo., by the author.

Thamnotettix orbonata, n. sp.—Resembling *atridorsum* and *infuscata* in general form, but paler. Pale, smoky greenish, with a broad rounding vertex. Length 5.25 mm. Vertex rounding to front, half as long as its basal width, a little more than half the length of the pronotum, one-third longer on middle than against the eye. Head slightly wider than the pronotum; front parallel margined, narrowing to the clypeus; clypeus narrow, constricted above the middle. Elytra much longer than the abdomen, broad and flaring slightly behind. Venation as in *atridorsum*. Colour pale green, slightly tinged with smoky brown. Elytra subhyaline, slightly iridescent; eyes dark; ocelli deep green. Genitalia: female segment short, over twice wider than long; posterior

margin very slightly sinuate; ovipositor long, slightly exceeding the rather slender pygofers.

Described from two females from Biscayne Bay, Fla., collected by Mrs. Slosson.

Thamnotettix Shermani, n. sp.—Resembling *cyperacea* in general appearance. Slightly stouter, paler, with a double-lined vertex margin and a deltocephaloid venation. Length 5.25 mm.; width 1.5 mm. Vertex flat; anterior margin obtusely angular, definitely and slightly acutely angled with the front, a third longer on middle than against eye, half wider than long. Elytra rather long, but with the apex broader than in *cyperacea*. Venation distinct, strong; two cross nervures between the sectors; the central anteapical cell long, constricted and divided beyond the middle. Colour: pale tawny, iridescent over a subolivaceous ground. Vertex pale tawny-yellow; anterior margin white, narrowly margined above and below with black, the black line above almost constricted into six dots. Elytra subhyaline with a slight tawny iridescence. Face pale tawny, below pale straw. Genitalia: female segment rather long; posterior margin nearly straight; the lateral angles prominent.

Described from one female taken at Raleigh, N. C., by Prof. Franklin Sherman, who sent a number of fine Jassidæ for determination.

Chlorotettix rugicollis, n. sp.—Resembling *spatulatus*, but with a broader vertex. Green, with a red band on the margin of vertex. Length 7 mm. Vertex broad, obtusely rounding, but little longer on middle than against eye, two and one-half times longer than wide, evenly rounding to front. Elytra rather long, the veins large and distinct. Colour: pale green, a transverse red band on margin of vertex and front, sometimes extending over the eyes. The male has the elytra clouded with tawny brown. Genitalia: female segment deeply triangularly excavated, with a strap-shaped tooth, similar to that in *spatulatus*. Male valve nearly as wide as the ultimate segment, and about half as long; plates nearly flat, long, triangular; the margins sparsely haired.

Described from four specimens: One female from Jacksonville, Fla., from Otto Heidemann; a pair from Woodbine, N. J., taken Aug. 2nd, 1902, by E. P. Van Duzee; and one female from Victoria, Tex., received from U. S. Nat. Museum. The remarkably broad vertex with the red margin will at once separate this from the other spatulate forms in this group.

Driotura gammeroidea, var. *fulva*, n. var.—Size and form of the species larger than var. *flava*. Entirely brownish fulvous, except the eyes, which are darker.

Described from eight specimens from Denver, Colo., collected by the author.

Driotura robusta, var. *vittata*, n. var.—Size and form of the species, black and white, variable. Vertex with a transverse light line on anterior margin, expanded into two spots at apex; four oblique black stripes on elytra, alternating with four light ones. A transverse light band on abdomen, and a broader one on face.

Described from six examples from Southern Colorado.

Acinopterus acuminatus, var. *variegatus*, n. var.—Form and structure of the species, but much lighter coloured. Vertex, pronotum and scutellum inclined to be reddish, especially in the male. Elytra whitish pruinose, nervures greenish, not margined, except towards apex and along the sutural margin, three fuscous points along the suture, and sometimes one on the disc of each elytron.

Described from twenty-four specimens from Colorado and Arizona.

A. acuminatus, var. *viridis*, n. var.—Form and structure of the preceding nearly; slightly smaller. Bright grass-green both above and below. Eyes and extreme tip of elytra fuscous.

Described from a number of specimens from Southern Colorado and Arizona. This is the common form in Southern Colorado, where it was collected by E. P. Van Duzee and the author.

A. acuminatus, var. *brunneus*, n. var.—Slightly larger than the preceding variety. Vertex, pronotum and scutellum pale green, washed with cinnamon-brown. Elytra pale cinnamon-brown, slightly fuscous at tip. Whole insect with a slight tawny iridescence, below pale green.

Described from three specimens from Rifle, Colo.; taken by the author.

Liburnia Slossoni, n. sp.—Resembling *Stenocranus lautus* in size and general appearance. Somewhat resembling *D. maidis*. Length, macropterous ♀, 5 mm. Face broad, strongly carinate, slightly narrowing above. Elytra very long and narrow, resembling a *Stenocranus*, the outer branch of the first and the inner branch of the third sector uniting with the cross nervure alongside the second sector. Colour: Face black, the carinæ light, basal compartment of vertex, pronotum and

scutellum pale creamy. A pair of parallel black stripes extending the entire length, interrupted on the sutures; a pair of black spots outside these on the posterior part of the scutellum, and a pair of black spots behind the eyes. Elytra pale creamy, subhyaline, a brownish stripe covers the outer part of the base of clavus and inner half of corium back to middle, beyond this the nervures are deep smoky-brown, except the outer fork of the outer sector, its cross vein and the outer apical nervure. Legs striped with fuscous and pale.

Described from three females collected at Biscayne Bay by Mrs. Annie T. Slosson. This very large and distinct form in this group is only one of the many fine Homoptera that have come to hand from Mrs. Slosson's collecting, and I take pleasure in naming it after her.

Phyllodinus flabellatus, n. sp.—Larger and lighter coloured than *nervatus*, and with a longer vertex. Testaceous brown, with the posterior half of the vertex, the scutellum and the tips of the short wing pads milky white. Length, brachypterous ♀, 3 mm., width 2 mm. Head slightly narrower than pronotum, vertex nearly quadrate, rounding in front. Front parallel margined, much longer than wide. Elytra about as long as head and pronotum, truncate behind, venation simple, indistinct. Colour: vertex and face dark brown, with about seven narrow interrupted transverse white bands. A light stripe across the apex of front, extending on across the genæ to join the stripe on the reflexed portion of pronotum. Clypeus piceus, pronotum with the anterior half piceous brown, posterior half and scutellum milky white. Elytra brown, the posterior margin milky white, broadest towards the costal margin. Abdomen above brown, a median and three lateral rows of white dashes, the anterior ones reduced to dots. Below dark brown or pitchy. Two anterior pairs of femora dirty straw, their foliaceous tibiæ fuscous, the tarsi white, tipped with black.

Described from two females, one from Washington, D. C., from the collection of Otto Heidemann, and the other from Riverton, N. J., collected by C. W. Johnson, and sent by E. P. Van Duzee. Another female from the District of Columbia apparently belongs here, but is immature and not fully coloured. This is a pretty species, and might be mistaken for a *Pissonotus* but for the foliaceous tibiæ.

TWO NEW PHYTOPHAGOUS HYMENOPTERA.

BY WILLIAM H. ASHMEAD, A. M., D. SC.

Xiphydria erythrogaster, sp. nov.— ♂. Length, 9.8 mm. Head and thorax black, marked with yellow as follows: The black of the head is confined to the occiput, a large spot on the crown is dilated on each side, but does not quite reach the eye, while the yellow is confined to the cheeks, the face to above the insertion of the antennæ, the front orbits and a V-shaped mark above the eyes. Mandibles yellow, with black teeth; prothorax yellow, with a black line on collar above and a black mark in the lateral depressions; mesonotum black, with two yellow spots on the disc; scutellum with the axillæ yellow; meso- and meta-sternum yellow, with black marks. The abdomen is pale ferruginous, except the first segment above, which is black; the dorsal segments 1 to 4 have a yellow spot on each lateral margin, while the ventral segments 4 to 6 have tufts of black hairs. The antennæ are 16-jointed, the first four joints pale ferruginous, the others black or blackish, joints 4 to 6 being tipped with yellow, the scape the longest joint, the third joint longer than the fourth, the following gradually shortening. Wings hyaline, faintly tinged, the veins brown. Legs pale ferruginous, the coxæ and trochanters more or less yellowish, or yellow in front.

Type.—Cat. No. 6844, U. S. N. M. (Ashmead collection).

Hab.—Avalon, N. J. (Charles W. Johnson).

Calameuta Johnsonii, sp. nov.— ♀. Length, 9 mm. Black and shining; the mandibles, except at apex, the apex of the third palpal joint, the front legs anteriorly from the middle of the femora to the fourth joint of the tarsi, a band on each side of abdomen, a spot at the apical angle of the 5th and 6th ventral segments, and the margins of the hypopygium, lemon-yellow; wings slightly smoky, the veins blackish, the stigma brown; antennæ thickened towards apex, 21-jointed, the third joint shorter than the fourth.

Type.—Cat. No. 6843, U. S. N. M. (Ashmead collection).

Hab.—Riverton, N. J. (Charles W. Johnson).

QUEBEC DIPTERA.

BY THOMAS W. FYLES, 54 WOLFE ST., LEVIS, QUEBEC.

I have taken, in the Province of Quebec, the undermentioned species of two-winged flies, the names of which do not appear in the Toronto Check List :

Culex consobrinus, *Desvoidy*.
Chironomus tæniapennis, *Coq.*
Tanypus hirtipennis, *Loew.*
Diplosis grassator, *Fyles.*
Bibio pallipes, *Say.*
Plecia heteroptera, *Say.*
Tipula cincta, *Loew.*
Pachyrrhina lugens, *Loew.*
Stratiomyia obesa, *Loew.*
Chrysopila quadrata, *Say.*
Leptis vertebrata, *Say.*
Leptis Boscii, *Macquart.*
Dasyllis flavicollis, *Say.*
Lampria bicolor, *Wiedemann.*
Leptogaster histrio, *Wiedemann.*
Argyramœba sinuosa, *Wied.*
Thereva senex, *Walker.*
Pterodontia flavipes, *Gray.*
Rhamphomyia umbrosa, *Loew.*
Dolichopus plumipes, *Scopoli.*
Syrphus xanthostomus, *Wied.*
Syrphus arcuatus, *Fallen.*
Sphegina rufiventris, *Loew.*
Rhingia nasica, *Say.*
Xylota curvipes, *Loew.*
Cistogaster immaculata, *Macq.*
Ocyptera Carolinæ, *Desv.*
Echinomyia florum, *Walker.*
Gonia capitata, *De Geer.*
Exorista vulgaris, *Fallen.*
Sarcophaga sarraceniæ, *Riley.*
Pollenia rudis, *Fabricius.*
Ophyra leucostoma, *Wiedemann.*
Anthomyia radicum, *Linneus.*
Blepharoptera lutea, *Loew.*
Tetanocera plebeja, *Loew.*
Pyrgota undata, *Wiedemann.*
Stictocephala cribellum, *Loew.*
Scioptera vibrans, *Linneus.*
Chætopsis ænea, *Wiedemann.*
Eutreta sparsa, *Loew.*
Eurosta solidaginis, *Fitch.*
Tephritis albiceps, *Loew.*
Palloptera superba, *Loew.*
Heteroneura spectabilis, *Loew.*

ENTOMOLOGICAL RECORD.—In the last two Annual Reports of the Entomological Society of Ontario, Dr. James Fletcher has given a very valuable and highly-interesting record of the important events in the world of Canadian Entomology noted during each year. As the preparation of this record involves a large amount of labour on his part and its completeness and consequent value depends upon individual workers throughout the Dominion, it is earnestly hoped that each one will send in, without delay, notes of any remarkable captures or interesting observations that he has made, and not put off doing so to the end of the season. If received week by week, the trouble of classifying the notes and the necessary correspondence is not very great, but if allowed to accumulate it becomes most burdensome. Address (postage free), Dr. James Fletcher, Central Experimental Farm, Ottawa.

NOTES ON THE STRIDULATION AND HABITS OF RANATRA FUSCA, PAL. B.

BY J. R. DE LA TORRE BUENO, NEW YORK.

Little is known regarding the sounds produced by the Rhynchota, and that little refers almost exclusively to the Cryptocerata, of which Corixa has had the most attention; and some few observations have been made on Nepa, Sigara and Notonecta. It seems to me, therefore, that it would be well to put on record the observations and notes made by me on the stridulation of *Ranatra*, together with a few other remarks on this insect.

Ranatra fusca, Pal. B., supposed to be the common form in the north-eastern portion of America, on being removed from its natural element, gives forth a peculiar note. Recently I have had the opportunity to study this at close range, in a specimen at present living in my aquarium. On taking the Hemipteron out of the water, the stridulation can be plainly felt by the fingers, even though, as is at times the case, no sound is audible. The vibrations, when heard, produce a rasping, creaky chirp. Careful examination shows that the sound-producing apparatus of *Ranatra* departs somewhat from the more commonly met devices, while being similar to that in other insects in regard to the general method of producing tonal vibrations by the friction of suitably roughened surfaces in contact. The stridulatory areas in this insect are situated in the deep and elongated coxal cavities of the first pair of legs. This, as far as I have been able to learn, is an unusual position, which is not mentioned by Packard in his "Text-book of Entomology"; nor have I been able to find any reference to the production of sounds by *Ranatra* in the literature on the subject that I have been able to consult.

For the proper comprehension of the *modus operandi*, a brief and necessarily superficial description of that portion of the thorax in which the coxæ are set is not out of place. The narrow, elongated prothorax of *Ranatra* is not of sufficient width to receive both coxæ with any space between them. In order, therefore, to provide for this, the segment in question expands cephalad, and is provided with two deep slits extending to the anterior margin, one on each side, for the reception of the coxæ. Due to the extreme shortness and transverseness of the head, the lateral processes of the cavities have the appearance of cheeks, and resemble somewhat the cheek-pieces of a Greek helmet. The coxæ rub against the inner surface of the exterior walls of the cavities. Doubtless this surface

is roughened in some manner, as well as the portion of joint mentioned, on the areas of friction. This mechanism cannot be properly explained without a dissection, hence the insufficiency of the preceding.

To stridulate, *Ranatra* holds the first pair of legs in the same plane as the body, perfectly straight, and somewhat separated at the extremities, in such a manner as to press the coxæ against the inner surface of the outer wall of the coxal cavity. The insect jerks its legs while in this position back and forth, and thus causes the vibration. Both legs may be in motion at once, independently of each other ; or one only may be waved about. Each leg, therefore, stridulates without reference to the other, as *Ranatra* jerkily moves it about in anger or excitement.

In the literature and references that I have been able to look up, no mention is made of this peculiarity of *Ranatra*, although it cannot have passed unnoticed by students of these hemipterous groups. In his "*Catalogus synonimicus et topographicus Rhynchotorum aquatilium hucusque in Italia repertorum*," Dr. A. Griffini gives a very full bibliography of the aquatic Rhynchota, and he records only one essay on the subject in question, " On Stridulation in the Hemiptera Heteroptera," by O. H. Swinton, which mentions *Nepa*, but makes no reference to *Ranatra*. Mr. G. W. Kirkaldy, F.E.S., also has had a paper on " The Stridulating Organs of Water Bugs (Rhynchota), especially of Corixidæ," treating principally of the last named. At some future date I shall endeavour to give a fuller account of the organs in *Ranatra*, together with a bibliography. Meantime, a few random notes on habits may not be without interest.

The way in which *Ranatra* seizes its prey is very characteristic. I feed mine on living flies, which are presented with a forceps under water. When the fly attracts its attention, *Ranatra* very slowly, almost imperceptibly, moves its fore-legs, with the knife-like tarsus away from the tibia, toward its prey. When the tibiæ are almost, or quite, touching the victim, the movement is so sudden and quick that one is aware of it only by seeing the prey seized. Sometimes its hold is not satisfactory, and then it will let go, first with one tarsus, get a firmer grip with that, and then do the same with the other. Once it has the fly securely held, *Ranatra* slowly approaches it to its extended beak, with which it seems to touch and feel it until it finds a suitable spot, and proceeds to a leisurely meal. From this it might seem that *Ranatra* depends for its food not on such inhabitants of the water as swim by, but on the unwary ones that come to

rest anywhere within reach of its rapacious claws, and then only for some time. This is somewhat borne out by the fact that there are two or three smaller insects in the aquarium with my specimen, which have thus far entirely eluded *Ranatra's* appetite.

A noticeable characteristic is the exceeding slowness of this insect's motions. They are practically imperceptible, and only the change of relative position of limbs or body makes one aware that it has moved. On occasion, *Ranatra* swims, not very fast nor very gracefully, but sufficiently well to afford it more rapid transportation when it chooses to resort to this method of locomotion. The fringing hairs of its long legs are of great help in this. The second and third pairs are the ones used in swimming and walking, or otherwise moving about, by this insect, the first pair being used almost exclusively for prehension.

SOME CORRECTIONS TO DR. DYAR'S LIST OF NOCTUIDS.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

I.

In Dr. Dyar's recent very full and careful List of North American Noctuids, Wash. Cat., pp. 98–247, are a few errors which I would briefly point out in this journal. They have mostly arisen from a neglect of a couple of papers in CAN. ENT., and one in Proc. Am. Phil. Soc., 1895, as well as from a two literal following of Prof. Smith's Washington list. With regard to the general sequence of the order adopted, I have given that preferred by myself in these pages, and can only repeat here that the Noctuid series *(Lithosia—Noctua)* affords a paralliel to that of the blues and skippers in the butterflies, and that I should place them below the series *Bombyx*, *Lacheis—Geometra*, disturbing as little as possible the older classifications.

For sequence and nomenclature see my paper, CAN. ENT., XXXIII., 116. The papers in CAN. ENT. apparently neglected by Dr. Dyar are: Vol. XXV., 217, and 153. The types of the forms therein described are, I believe, in the National Museum, Washington. They were sent at the time to Prof. Riley.

I shall not especially and in detail again refer to the names of Mr. Walker which incorrectly replace for the moment certain of these given by me. They have been already discussed in these pages; all the facts with regard to the use of *Hormisa* are given by me in the paper in the Am. Phil. Proceedings, above alluded to, p. 429, 1895. For *Hormisa*, which is a synomyn of *Epizeuxis*, the term *Litognatha* should be substituted.

A small box was mailed to me at Bremen by the late Mr. Hill, from Albany. As I remember, it contained, among the few specimens, the types of *Hepialus auratus* (*Sthenopis*, Cat. p. 580) and *Rheumaptera immediata* (3404 Cat., marked with a star and type stated to be "lost").

The contents of the box were deposited in the Bremen Museum for preservation.

In Dr. Dyar's list of Noctuids, I notice the following double names: The specimens identified as 2249 *sericea*, are probably 2253 *venustula*. What *sericea* is, is not known; the erroneous determination came from Albany. No. 2134 and No. 2143 I considered identical. No. 2201 should be referred as synonymous with No. 2223. The original name was changed by the authors.

2473. *Formosa* is type of *Chrysanympha*, Grote, Proc. Am. Phil. Soc., 417, 1895. I cannot regard this as congeric with *moneta*, which is type of *Polychrysia*, Hubn. (Grote, id.). But I may be wrong.

2475. *Æreoides*, not "*œroides*"; this mistake is copied from Smith, Wash. Cat. 247.

2479. *Festucæ* is type of *Chrysaspidia*, Hubn. Verz. (Grote, id.), and *illistris* is type of *Euchalcia*, which latter term is therefore here wrongly employed, and should be dropped. Speyer, Staudinger and myself agree that *Putnami* is not a race of *festucæ*, but a distinct species, and it appears to be also Asiatic in its range (Staud. and Rebel Cat. 2547, p. 237).

2489. *Egena*: the identification of this species from Florida, given in Smith's List, p. 251, CAN. ENT., XV., 26, should have been cited.

2493. The identification of *fratella* with *ou* is incorrect, as stated by Smith, Wash. List, p. 252. The two are distinct species, in my opinion. Any confusion between them seems to arise from a wrong identification of Guenée's species.

On page 206 of Dr. Dyar's List, the genera, *Oxycilla tripla* and *Zelicodes linearis*, Proc. Am. Phil. Soc., l.c., 1895, are omitted. *Linearis* is wrongly cited under "*Hormisa*." No. 3033. Of this species Prof. Smith has written that it does not belong to *Litognatha*, and is not a Deltoid at all. Types of these two species are in coll. Neumogen, where Dr. Dyar examined them for me, l.c., p. 418.

Mailed August 1st, 1903.

The Canadian Entomologist.

Vol. XXXV. LONDON, SEPTEMBER, 1903. No. 9

LIST OF CANADIAN COLEOPTERA.

BY JOHN D. EVANS, TRENTON, ONT.

The following list has been prepared from collections made in the Northwest Territories of Canada during the seasons of 1879, 1880 and 1881, by Prof. John Macoun, Botanist of the Geological Survey Department of Canada.

During the summer of 1879 collecting was done, starting from Fort Ellice, thence to the head of Long Lake; thence to the elbow of the South Saskatchewan ; then after crossing the river, in an almost straight line to Battleford ; then south to the Hand Hills, and still south to Blackfoot crossing ; thence west to Calgary, and up the Bow River to the gap in the Rocky Mountains.

In 1880 collecting commenced at Brandon ; thence to Moose Mountains, from there to Moose Jaw ; thence by Swift Current Creek to the Cypress Hills and Fort Walsh ; from Fort Walsh to Dunmore, and then towards the South Saskatchewan, and on to Humboldt, on the old north trail, and thence to Fort Ellice.

In 1881, starting from Portage la Prairie ; thence to Lake Manitoba; then up Lake Manitoba and Lake Winnipegosis to its head ; then up Red Deer River to its head ; then down Swan River to Livingstone, and across to the Assiniboine at Fort Pelly, and down it to Fort Ellice.

The first two years were almost wholly on the plains, and collections made largely on mud by pools and in sand hills. The third year was almost wholly by water.

The species taken during each of these seasons are indicated by the abbreviated figures '79, '80 and '81, respectively.

An asterisk (*) before the several names indicates a species not heretofore recorded as having occurred in Canada, in so far as the Society's list and lists appearing subsequently in The Canadian Entomologist are concerned.

The numbers are those of *Henshaw's* List.

The compiler is very grateful to all who have assisted in determining these insects, particular mention being made of Mr. Henry Ulke, the late Dr. John Hamilton and Prof. H. F. Wickham, for their very many acts of kindness.

Cicindelidæ.

1ëc, Cicindela Montana, Lec., 1879.
*25a, " Audubonii, Lec., '79, '80.
25d, " 10-notata, Say, '80.
26a, " generosa, Dej., '80.
30a, " limbata, Say, '79, '80.
32, " vulgaris, Say, '80.
33, " repanda, Dej., '80, '81.
35, " hirticollis, Say, '79
*36, " cinctipennis, Lec., '79, '80.
*55, " lepida, Dej., '79.

Carabidæ.

*92, Cychrus angusticollis, Fisch., '79.
116, Carabus Mæander, Fisch., '81.
119, " tædatus, Fab., '79, '80, '81.
121. " serratus, Say, '79, '80, '81.
*137, Calosoma obsoletum, Say, '79, '80.
142, " calidum, Fab., '79, '80.
142a, " tepidum, Lec., '79, '80.
*145, " moniliatum, Lec., '79.
*148b, " Zimmermanni, Lec., '79, '80
153, Elaphrus cicatricosus, Lec., '79, '80
157, " riparius, Linn., '79.
160, " ruscarius, Say, '80, '81.
165, Blethisa multipunctata, Linn., '81.
178, Notiophilus sibiricus, Mots., '79, '80.
180, Leistus ferruginosus, Mann, '79.
217, Pasimachus elongatus, Lec., '80.
225, Dyschirius nigripes, Lec., '80.
305, Bembidium carinula, Chd., '79, '81.
*306, " Lorquinii, Chaud., '79.
307, " littorale, Oliv., '81.
311, " coxendix, Say, '79.

313, Bembidium nitidum, Kirby, '79, '80.
*, " fuscicrum, Motz., '79.
359, " scopulinum, Kirby, '80.
*361, " postremum, Say, '79, 81.
363, " Grapii, Gyll., '80.
*378, " viridicolle, Laf., '79, '80.
*380, " variolosum, Motz.
384, " conspersum, Chd., '79, '80, '81.
386, " patruele, Dej., '81.
389, " nigripes, Kirby, '79, '80.
*403. " Scudderi, Lec., '79, '80.
*420. " semistriatum, Hald., '79.
*, " timidum, Lec., '79, '80.
" 2 sp., '79.
" 2 sp., '80.
449, Tachys nanus, Gyll., '79.
550, Pterostichus punctatissimus, Rand., '81.
*558, " scitulus, Lec., '79.
*561, " corvus, Lec., '79.
565, " lucublandus, Say, '80.
*567, " convexicollis, Say, '80.
583, " Luczotii, Dej., '79, '81.
588, " femoralis, Kirby, '80.
*628, Amara jacobinæ, Lec., '80.
647, " latior, Kirby, '79.
*654, " longula, Zimm., '79, '80.
657, " impuncticollis, Say, '79, '80.
658, " littoralis, Mann, '79, '80.
664, " fallax, Lec., '79, '80.
669, " erratica, Sturm., '80.
674, " obesa, Say, '79. '80.
*676, " terrestris, Lec , '79.
*678, " remotestriata, Dej., '79, '80.
" sp., '79.
" sp , '79, '80.
" sp., 80.

710, Diplochila laticollis, Lec., '79, '80.
711, " impressicollis, Dej., '80.
742, Calathus gregarius, Say, '80, '81.
743, " ingratus, Dej., '81.
766, Platynus sinuatus, Dej , '79, '81.
*782, " funebris, Lec., '79, '80.
786, " errans, Say, '79, '80, '81.
796, " corvus, Lec., '79, '80.
800, " cupripennis, Say, '79, '80.
815, " placidus, Say, '79, '80.
818, " cupreus, Dej., '79.
821, " obsoletus, Say, '79.
831, " ruficornis, Lec., '79.
835, " lutulentus, Lec., '81.
836, " nigriceps, Lec., '79.
" sp., '79.
" sp., '80.
882a, Lebia mœsta, Lec., '80.
911, Blechrus nigrinus, Mann, '79.
940, Cymindis cribricollis, Dej., '79, '80.
*941, " planipennis, Lec., '79, '80.
996, Chlænius sericeus, Forst., '80.
1021, " pennsylvanicus, Say, '80, '81.
1028, " interruptus, Horn, '81.
1052, Geopinus incrassatus, Dej., '79, '80.
*1054, Nothopus zabroides, Lec., '79, '80.
*1057, Piosoma setosum, Lec., '79.
1061, Agonoderus pallipes, Fab., '79, '80.
1079, Harpalus erraticus, Say, '80.
1081, " amputatus, Say, '79, '80.
1082, " viridiæneus, Beauv., '80.
1087, " Pennsylvanicus, Dej., '80.
1094, " herbivagus, Say, '79, '80.
*1096, " ventralis, Lec., '80.
*1099, " ellipsis, Lec., '80.
1101, " cautus, Dej., '79, '80.
1102, " innocuus, Lec., '79.
1106, " Lewisii, Lec., '79.

1110, Harpalus funestus, Lec., '79.
1117, " basilaris, Kirby, '79.
" 3 sp., '79.
" 2 sp., '80.
1140, Stenolophus conjunctus, Say, '79, '80.
1158, Bradycellus rupestris, Say, '80.

Dytiscidæ.

1302, Cœlambus impressopunctatus, Sch., '80.
1399, Ilybiosoma bifarius, Kirby, '80.
1425, Agabus punctulatus, Aubé, '80.
*1436, " strigulosus, Cr., '79, '80.
1438, " infuscatus, Aubé, '80.
1444, " erythropterus, Say, '80.
1466, Rhantus bistriatus, Bergst., '81.
1474, Colymbetes sculptilis, Harr., '79.
1491, Dytiscus Harrisii, Kirby, '81.
" sp., '79, '80.

(To be continued.)

A NEW PARANOMIA FROM BRITISH COLUMBIA.

BY WILLIAM H. ASHMEAD, A. M., D. SC.

Paranomia Venablesii, sp. nov.—♀. Length 10.5 mm. Black; abdominal segments 1–4 at apex with bands of a golden-yellowish pubescence; the head in front, the cheeks, the occiput, the thorax in front at the sides, the postscutellum, the legs, and the abdomen beneath, all clothed with a pale or whitish pubescence. Wings hyaline, fuliginous at apex, the costæ and parastigma black, the stigmal and internal veins testaceous. Legs mostly black, with tarsal joints 2–5 mostly yellowish. The head is rather finely, sparsely punctate, the thorax more closely and densely punctate, but with the punctures finer on the scutellum, while the metathorax is shagreened, opaque. The abdomen has the first segment minutely punctulate, the following segments being more or less alutaceous.

Type.—Cat. No. 6224, U. S. N. M.

Described from a single specimen, captured July 20th, 1902, at Vernon, B. C., by Mr. E. P. Venables.

SOME DIPTERA FROM ARIZONA.

BY JAMES S. HINE, STATE UNIVERSITY, COLUMBUS, OHIO.

In a collection of Diptera, taken in Arizona by J. Thomas Lloyd, of Cincinnati, Ohio, during the summer of 1902, I find some species of sufficient importance to warrant recording notes concerning them at this time.

Chrysops proclivis, O. S.—Specimens of this species were taken in Oak Creek Canyon, July 5th. I have not seen a record of the species from this territory heretofore.

Tabanus hyalinipennis, n. sp.—Female. Eyes bare; length 15 mm.; antennæ entirely black; proboscis black; palpi yellowish, with short white hairs; face and front brown, but this colour concealed by gray pollen; lower part of face and cheeks clothed with long white hair; front rather narrow, slightly narrowed below; frontal callosity shining brown, nearly square, and as wide as the front and with a linear prolongation above it; thorax reddish above, with four distinct black stripes, which extend back to the scutellum; margin of scutellum reddish, with white hair, remainder blackish, with black hair; femora black, with gray pollen and white hair; tibiæ reddish; apices black, or at least dark; tarsi black; wings entirely hyaline; veins and stigma brown, all the posterior cells wide open. Abdomen black dorsally; first segment broadly white on each side; posterior margin narrowly white, and a white spot beneath the scutellum; second segment with a prominent white triangle on each side of the middle and a white hind margin, which is three or four times as wide external to the triangles as between them; third segment with a narrow white marking on each side corresponding to the lateral triangles of the previous segment and white hind margin, which expands at the middle into a prominent spot, truncate before and attaining the middle of its segment; fourth segment with a narrow white hind margin, which expands into a prominent median triangle, which attains the anterior border of its segment; fifth, sixth and seventh segments with very narrow white hind margins. Ventrally the abdomen is dark, darkest on the middle, and clothed with gray pollen.

Habitat.—Oak Creek Canyon. Several specimens, two of which are before me; one taken July 2nd and the other July 7th.

In form and appearance the species suggests *T. trimaculatus*, but the hyaline wings, the abdominal markings and smaller size are distinctive. It lacks the large median white triangle on the second segment, so conspicuous in *sodalis*.

Leptomydas venosus, Lw.—The species of this genus seem not to be easily recognized, because the sexes of each species are widely different, and all the original descriptions were written from a single sex, some from males and some from females. In the collection before me are the sexes of a species, the male of which agrees very well with *venosus*. I give below the descriptions of both sexes, hoping that such may be of use to some future student of the group :

Male.—Head and its appendages black ; face and front clothed with long yellowish gray pile. Thorax black, with four light-coloured stripes above ; anterior and middle legs black, with extreme bases of all the tibiæ yellowish ; broad bases of posterior femora and tibiæ yellow, otherwise these legs are black or brown ; wings uniform dilute yellowish. Abdomen reddish ; posterior margins or all the segments narrowly yellow, and on each side of the second segment the yellow margin surrounds a small reniform black spot ; anterior margins of all the segments black ; the first segment is wholly black, except the yellow hind margin, and on the sixth and seventh segments the black is mostly confined to the sides. Length 15 mm.

Female.—Whole insect reddish-yellow ; eyes, proboscis and part of front blackish ; thorax with light yellow stripes ; abdominal segments margined behind with distinct light yellow ; on each side of the second segment this yellow margin includes a small reniform black spot ; spines at end of abdomen red ; wings coloured as in the male. Length 19 mm.

In both male and female the first posterior cells of the wings are wide open.

Habitat.—Both sexes taken in Oak Creek Canyon, June 30th.

In the female the black proboscis, the lack of black stripes on the lateral margins of segments (two to seven) and the red spines at the end of the abdomen serve to distinguish this sex from *brachyrhynchus* of Osten Sacken.

Myiolepta aurinota, n. sp.—Male. Length 9 mm. In general coloration the antennæ are reddish, but the first two segments are darker and more shining than the third ; arista at base concolorous with the

segment that bears it, at apex darker. Region surrounding the ocelli, a space above the antennæ, a triangular spot on the face, including the facial callosity and cheeks, shining black ; remainder of the face and front gray pollinose, with sparse white hairs near the eyes. Mesonotum, including the scutellum, entirely densely clothed with coarse golden hair ; pleura with white hair ; wings nearly hyaline, but from certain views they appear slightly clouded ; general colour of legs black, with white hair ; all the tibiæ yellowish at base ; first two segments of each of the middle and hind tarsi yellow ; first two segments of each front tarsus dusky, but lighter in colour than the three remaining segments ; all the femora swollen, and with short black spines below on apical parts. Abdomen black, clothed on dorsum with black and golden hair, on sides with white hair ; the black hair of the dorsum is very short, and distributed as follows : the anterior half of the second segment, a rectangular patch on anterior middle of the third segment, occupying two-thirds of the length and over half of the width of this segment, and a triangular patch on the anterior third of the fourth segment. The golden hair is longer and coarser than the black, and most dense on the fourth segment. The first segment, and all the sutures between segments, are thinly gray pollinose, giving the effect to the unaided eye of gray bands.

Habitat.—Phœnix, Arizona. Taken June 18th.

The species has most affinities with *strigilata*, Loew, and *auricaudata*, Williston, but on comparison with the former species in the U. S. National Museum, I find the two have a very different appearance. From the latter the coloration of the abdomen and legs, the lack of "golden tomentum" on the frontal triangle, and the larger size are sufficient to distinguish it. In accordance with what has been observed in related species, I should expect that the vestiture of the female is paler than in the male.

Milesia bella, Townsend.—Several specimens of this beautiful syrphid were taken at Elden Mountain, June 17th. The black front tibiæ and tarsi and the thoracic markings easily distinguish the species from *ornata*, Say, which is our common eastern member of the genus. A reference to Townsend's fine description in the Annals and Magazine of Natural History, Ser. 6, Vol. XIX., 142, will reveal the characters of *bella* and its differences from *ornata*. Townsend's types were taken in southern New Mexico.

A LIST OF CALIFORNIA APHIDIDÆ.

BY WARREN T. CLARKE, BERKELEY, CALIF.

Our knowledge of the group Aphididæ in California has been limited in the past to certain forms that were of economic importance in their relations to cultivated crops. No systematic list of these interesting insects has heretofore been attempted in this region, and this has not been due to any lack of material, for the varying conditions of climate here seem to be particularly favorable to them.

In Hunter's list of the Aphididæ of North America (Bull. No. 60, Iowa Ag. Ex. Sta., 1901) we find nine forms that may be considered as reported from California. Only five of these forms are directly referred to this State, while the other four are stated to be found, as in the case of *Nectarophora avenæ*, Fabr., "throughout the United States." One of the five forms directly referred to the State is *Aphis mali*, Fabr. The writer is doubtful of the occurrence of *mali* here, and believes that other species have been confused with it, and therefore does not include it as a California form. With this exception the following list is made up from the reported Aphididæ of California and from the writer's own collections in the State during the past eighteen months.

Forty-three species are listed, including ten new species. This number does not by any means exhaust the group so far as this State is concerned, as it represents but few localities, yet it is believed that the presentation of the list at this time is desirable, in that it may stimulate further study of the group by other observers.

Table of Genera.

A. Third discoidal vein wanting ..... Phylloxera.
AA. " " " simple ..... Pemphigus.
AAA. " " " one-branched ..... Schizoneura.
AAAA. " " " two-branched.
B. Antennæ five-jointed ..... Lachnus.
BB. Antennæ seven-jointed.
C. Style long.
D. Frontal tubercles toothed internally ..... Phorodon.
DD. Frontal tubercles not toothed internally.
E. Frontal tubercles approximate ..... Nectarophora.
EE. Frontal tubercles distant ..... Myzus.
CC. Style short.

F. Honey tubes long.
G. Antennæ on frontal tubercles ..... Rhopalosiphum.
GG. Antennæ not on frontal tubercles.
H. Honey tubes clavate ..... Siphocoryne.
HH. Honey tubes cylindrical.
I. Body long ..... Hyalopterus.
II. Body short ..... Aphis.
FF. Honey tubes short.
J. Antennæ shorter than body .... Chaitophorus.
JJ. Antennæ longer than body.
K. Honey tubes longer than broad ..... Drephanosiphum.
KK. Honey tubes shorter than broad ..... Callipterus.

PHYLLOXERA.—*Vastatrix*, Planchon; Vitis vinifera; California.

PEMPHIGUS.—Stigma more than twice as long as broad, *populicaulis*; less than twice as long as broad, *betæ*.

Populicaulis, Fitch; cottonwood and poplar; Fresno, Berkeley, Rumsey.

Betæ, Doane; sugar-beet, Canaigre (Rumex hymenosepalous); red dock; Berkeley, Placer County, Palo Alto.

While these two forms of Pemphigus are reported as separate species, it is the opinion of the writer that it will be found that one is a migrant form of the other. I have noted *betæ* to be extremely prevalent on sugar-beets planted near cottonwoods infested with *populicaulis*.

SCHIZONEURA.—Abdomen chocolate-brown, *lanigera*; pale green, *pinicola*; black, *querci*; lilac brown, *Americana*.

The colour effect is best obtained by bathing the fresh specimens for a short time in 95% alcohol.

Lanigera, Haus.; apple; throughout the State.

Pinicola, Thos.; Pine *(P. radiata)*; Berkeley, Palo Alto.

Querci, Fitch; various oaks; Berkeley.

Americana, Riley; elm; Berkeley, Newcastle.

LACHNUS. *Alnifoliæ*, Fitch; alder (*Alnus*, sp.); Berkeley, Colfax.

CHAITOPHORUS.—*Viminalis*, Monell; willow; Newcastle, Watsonville.

CALLIPTERUS.—

A. Body with dorsal setæ.
B. Body less than twice as long as broad.

C. Colour very pale ..... hyalinus.
CC. Colour dark yellow ..... coryli.
BB. Body more than twice as long as broad.
D. Four rows of setiferous tubercles on back of abdomen ..... castaneæ.
DD. Setiferous tubercles not in rows ..... arundicolens.
AA. Body without dorsal setæ.
E. Seventh joint of antennæ shorter than sixth ..... caryæ.
EE. Seventh joint of antennæ longer than sixth ... betulæcolens.

Caryæ, Monell ; black walnut ; Berkeley.

Betulæcolens, Fitch ; birch ; Berkeley.

Castaneæ, Fitch ; chestnut ; Berkeley.

Arundicolens, n. sp.—Apterous viviparous female.

Length of body, 1.54 mm.; width 69 mm. Length of joints of antennæ : III., .77 mm.; IV., .50 mm.; V., .54 mm.; VI., .27 mm.; VII., .27 mm. Body setiferous ; general colour light lemon-yellow to darker yellow. Nectaries reduced to tubercles. Cauda wart-like. Rostrum reaching to second coxæ. Antennal joints III., IV. and V. black at outer ends. Tarsi dusky. Eyes red-brown.

Alate viviparous female.

Length of body, 2.19 mm.; width, .81 mm. Expanse of wings from tip to tip, 7.19 mm. Length of joints of antennæ : III., 1.04 mm.; IV., .58 mm.; V., .61 mm.; VI., .35 mm.; VII., .35 mm. General colour of body light lemon-yellow. Wings hyaline ; veins and stigma greenish. Cauda short, tip black. Nectaries reduced to tubercles. Tarsi dusky. Eyes red. Sixth antennal joint dusky; Vth and IVth black at outer end; IIIrd ringed with black one-third distance from joint II. and at outer end.

Small colonies, and also distributed singly on under sides of leaves of bamboo (*Arundo*, sp.), Berkeley.

Hyalinus, Monell ; oak (*Quercus imbricata*) ; Berkeley.

Coryli, Gœtze ; hazelnut (*Corylus*, sp.) ; Berkeley.

Drephanosiphum.—*Acerifolii*, Thos. ; live oak ; Berkeley.

Hyalopterus.—*Arundinis*, Fabr. ; apricot ; Berkeley.

Aphis.—

A. Antennæ not more than half the length of body.
B. Honey tubes reaching not quite half way to tip of abdomen.
C. Honey tubes red-brown ..... Alamedensis.
CC. Honey tubes yellow ..... calendulicola.
CCC. Honey tubes black.

D. Body less than twice as long as broad.....persicæ-niger.
DD. Body more than twice as long as broad ....maidis.
BB. Honey tubes reaching more than half way to tip of abdomen.
E. Cauda more than twice as wide at base as at tip (conical).....mori.
EE. Cauda about as wide at base as at tip (filiform) ....œnotheræ.
AA. Antennæ three-fourths or more length of body.
BBB. Honey tubes reaching beyond tip of abdomen.
F. Cauda inconspicuous ....sorbi.
FF. Cauda evident.
G. Cauda about as wide at tip as at base (filiform)..... .....gossypii.
GG. Cauda more than twice as wide at tip as at base (conical) .....ceanothi.
BBBB. Honey tubes not reaching to tip of abdomen.
H. Cauda inconspicuous .....brassicæ.
HH. Cauda evident ..... cratægi.

Brassicæ, Linn.; throughout the State on various cruciferæ.

Calendulicola, Monell; marigold; Berkeley.

Cratægi, Monell; hawthorn (*Cratægus*, sp.); Berkeley.

Gossypii, Glover; shepherd's-purse, watermelon; Newcastle. Watsonville.

Ceanothi, n. sp.—Apterous viviparous female.

Length of body, 1.46 mm.; width, 1.19 mm. Length of joints of antennæ: III., .31 mm.; IV., .16 mm.; V., .16 mm.; VI., .13 mm; VII., .27 mm. Body smooth, globular; general colour clouded yellow-brown. Nectaries reaching beyond end of body, black. Cauda conical, inconspicuous. Legs and antennæ of a uniform yellow-brown colour. Eyes black.

Alate viviparous female.

Length of body, 1.54 mm.; width, .58 mm.; expanse of wings from tip to tip, 5.58 mm. Length of joints of antennæ: III., .38 mm.; IV., .19 mm.; V., .19 mm.; VI., .15 mm.; VII., .27 mm. Colour of head and thorax jet black; abdomen clouded yellow-brown. Wings opalescent, veins dark green. Third discoidal vein obsolete at base. Cauda conical, yellow-brown in colour. Nectaries reaching beyond tip of body, black. Tibiæ yellow-brown except outer end, which is dusky. Other joints of legs dusky. Antennal joints yellow-brown. Eyes black.

Large colonies on tender tips and on blossoms of *Ceanothus integerrimus*, Colfax.

Alemedensis, n. sp.—Apterous viviparous female.

Length of body, 1.27 mm.; width, .50 mm. Length of joints of antennæ: III., .15 mm.. IV., 08 mm.; V., .15 mm.; VI., .08 mm.; VII., .23 mm. Body smooth, general colour yellow-green to red-brown. Nectaries red-brown, reaching not quite half-way to tip of abdomen. Cauda conical. Eyes red.

Alate viviparous female.

Length of body, 2.31 mm; width, .77 mm. Expanse of wings from tip to tip, 6.15 mm. Length of joints of antennæ: III., .50 mm.; IV., .31 mm.; V., .19 mm.; VI, .12 mm.; VII., .38 mm. Head and thorax black. Abdomen yellow-green to dark brown. Wings hyaline, veins yellowish. Third discoidal vein obsolete at base. Cauda conical and of same colour as rest of abdomen. Nectaries not reaching to end of body, black. Legs dusky. Antennæ dusky yellow. Eyes dark red. Flocculent masses of wax covering abdomen.

Rather large and numerous colonies on leaves of Greengage. Alameda County.

Maidis, Fitch; sorghum, corn; Berkeley, Watsonville.

Mori, n. sp.—Apterous viviparous female.

Length of body, 1.04 mm.; width, .65 mm. Length of joints of antennæ; III., .12 mm.; IV., .06 mm.; V., .06 mm.; VI., .12 mm.; VII., .15 mm. Head and thorax fuscous, abdomen dark green. Nectaries fuscous, reaching to tip of abdomen. Cauda conical. Tarsi dusky, other joints of legs yellow green. A row of six dark spots extends from the nectaries to the thorax on each side of the abdomen. Rostrum extends to middle coxæ. Eyes dark.

Alate viviparous female.

Length of body, 1.22 mm.; width, .54 mm. Expanse of wings from tip to tip, 3.77 mm. Length of joints of antennæ: III., .15 mm.; IV., .12 mm.; V., .12 mm.; VI., .08 mm.; VII., .23 mm. Head and thorax greenish-black. Abdomen yellowish-green, with two black dorsal patches. Wings hyaline, veins greenish. Stigma, long, narrow, greenish. Cauda conical, dusky. Nectaries black, reaching to tip of abdomen. Legs and antennæ dusky. Eyes black.

Found on under sides of leaves of mulberry (*Morus*, sp.), appearing in enormous numbers, and giving the attacked trees a dirty, smutty appearance.

Œnotheræ, Oestl.: *Œnothera bectiana*, *Epilobium* ; Berkeley.

Persicæ-niger, Smith ; peach, plum ; Placer County.

Sorbi, Kalt ; apple ; Placer County.

SIPHOCORYNE.—*Fœniculi*, Pass.; sweet fennel (*F. vulgare*); Berkeley, Newcastle.

RHOPALOSIPHUM.—*Dianthi*, Schrank ; English ivy ; Berkeley.

MYZUS.—*Cerasi*, Fabr.; Greengage ; Berkeley.

PHORODON.—*Scrophulariæ*, Thos.; *Scrophularia*, sp.; Berkeley.

Humuli, Schrank. Reported as present on hops and *Prunus domesticus*, in this State. Unknown to me.

NECTAROPHORA.—

A. Antennæ as long or longer than body.
  B. Honey tubes reaching beyond tip of abdomen.
    C. Honey tubes black ..... valerianiæ.
    CC. Honey tubes clouded yellow.
      D. Body more than twice as long as broad.
        E. Cauda more than twice as wide at base as at tip (conical) ..... rosæ.
        EE. Cauda about as wide at base as at tip (filiform). Californica.
      DD. Body less than twice as long as broad.
        F. Cauda more than twice as wide at base as at tip (conical) ..... rhamni.
        FF. Cauda about as wide at base as at tip (filiform) ..... baccharidis.
  BB. Honey tubes reaching to tip of abdomen.
    G. Honey tubes black ..... sonchella.
    GG. Honey tubes yellow ..... lycopersici.
AA. Antennæ shorter than body.
    H. Honey tubes and cauda black ..... citrifolii.
    HH. Honey tubes and cauda clouded yellow. . . jasmini.

Citrifolii, Ashm.; orange ; Azusa.

Jasmini, n. sp.—Apterous viviparous female.

Length of body, 1.73 mm.; width; .58 mm. Length of joints of antennæ: III., .23 mm.; IV., .23 mm.; V., .19 mm.; VI., .12 mm.; VII., .38 mm. General colour yellowish-green. Nectaries reaching beyond tip of abdomen, clouded yellow in colour, with outer ends darker. Tarsi dusky ; other joints of legs light yellow. Antennal joint III. light yellow; others dusky. Rostrum reaching to third coxæ. Eyes pink.

Small colonies on under sides of leaves of jasmin. No winged specimens found. Berkeley.

Sonchella, Monell ; *Sonchus*, sp. (Sow thistle) ; Berkeley, Palo Alto, Newcastle.

Lycopersici, n. sp.—Apterous viviparous female.

Length of body, 2.31 mm. width, .58 mm, Length of joints of antennæ : III., .65 mm.; IV., .54 mm.; V., 54 mm.; VI., .15 mm.; VII., .77 mm. General colour green. Nectaries yellow, occasionally dusky at outer end, reaching to tip of abdomen. Cauda prominent, green, outlined with black. Tarsi black. Tips of tibiæ black. Rest of tibiæ and femora dusky. Eyes red

Alate viviparous female.

Length of body, 2.50 mm.; width, .96 mm. Expanse of wings from tip to tip, 8.65 mm. Length of joints of antennæ : III., .77 mm.; IV., .58 mm ; V., .58 mm.; VI., .19 mm.; VII. .77 mm. General colour green. Nectaries yellow, occasionally dusky at outer end, reaching beyond tip of abdomen. Cauda prominent. Tarsi black. Tip of femur and tibiæ black, rest of joints of legs greenish, yellow. Antennæ dusky. Wings hyaline, veins and stigma yellow-green. Third discoidal vein obsolete at base.

A handsome insect, found on tomato, generally on the blossoms, which they destroy. Occasionally found on tender leaves. Individuals isolated or in very small colonies. Berkeley.

Valerianiæ, n. sp.—Apterous viviparous female.

Length of body, 2.85 mm ; width, 1.15 mm. Length of joints of antennæ : III., .81 mm.; IV., .69 mm.; V., .58 mm.; VI., .19 mm ; VII., .88 mm. General colour of body yellow-brown. Nectaries black, reaching beyond tip of abdomen. Cauda prominent. Antennæ dusky. Tarsi and outer ends of femur and tibia black. Rest of joints of legs yellowish. Rostrum reaching to third coxæ and tipped with black. Eyes yellowish.

Alate viviparous female.

Length of body, 2.92 mm.; width, 1.15 mm. Expanse of wings from tip to tip, 9.61 mm. Length of joints of antennæ : III., 1.00 mm.; IV., .77 mm.; V., .65 mm.; VI., .19 mm.; VII , .96 mm. Antennæ and head, back of thorax, nectaries and outer ends of femora and tibiæ black. General colour of rest of body and legs yellow-brown. Wings greenish-yellow, veins darker. Third discoidal vein obsolete at base. Rostrum reaching to second coxæ. Cauda prominent. Nectaries reaching beyond tip of abdomen. Eyes black.

Small colonies on growing tip of valerian *(Valeriana officinalis)*, Berkeley.

Rhamni, n. sp.—Apterous viviparous female.

Length of body, 1.73 mm.; width, .81 mm. Length of joints of antennæ: III., .50 mm.; IV., .38 mm.; V., .38 mm.; VI., .19 mm.; VII., .96 mm. General colour green. Nectaries greenish-yellow, reaching beyond tip of abdomen. Cauda prominent, conical. Legs and antennæ light yellow. Rostrum reaching to middle coxæ. Eyes dark red.

Small colonies on under sides of leaves of *Rhamnus Californica*. No winged specimens found. Lander.

Baccharidis, n. sp.—Apterous viviparous female.

Length of body, 1.38 mm.; width, .62 mm. Length of joints of antennæ: III., .58 mm.; IV., .27 mm.; V., .27 mm.; VI., .11 mm.; VII., .38 mm. General colour of body green. Nectaries clouded yellow, reaching well beyond tip of abdomen. Antennæ, tibiæ and tarsi dusky. Cauda prominent, filiform. Rostrum dusky, reaching to second coxæ. Eyes dark red.

Alate viviparous female.

Length of body, 2.11 mm.; width .77 mm. Expanse of wings from tip to tip, 6.92 mm. Length of joints of antennæ: III., .62 mm.; IV., .31 mm.; V., .31 mm.; VI., .15 mm.; VII., .38 mm. General colour of body green. Nectaries, tip of femora, tibiæ and tarsi black. Wings hyaline, stigma greenish, veins dusky. Cauda prominent. Nectaries reaching much beyond tip of abdomen. Eyes dark red.

Isolated individuals and small colonies on *Baccharis*, sp. Berkeley.

Rosæ, Linn. Very common on rose in many parts of the State.

Californica, n. sp.—Apterous viviparous female.

Length of body, 1.92 mm.; width, .77 mm. Length of joints of antennæ: III., .35 mm.; IV., .38 mm.; V., .50 mm.; VI., .19 mm.; VII., 1.08 mm. General colour green. Joints of the antennæ and the tarsi black. Rostrum reaching to second coxæ, tip black. Nectaries yellow-green, reaching beyond tip of abdomen. Eyes pale.

Small colonies on tips of new growth of willow. No winged individuals present. Newcastle.

Avenæ, Fabr. Present in the State, but unknown to me, and not included in synoptical table.

FOUR NEW SPECIES OF CULEX.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Culex cantator, new species.—Female. Near *sylvestris*, but the seventh abdominal segment almost wholly yellow scaled, etc. Head black, oral margin and base of antennæ yellow, remainder of antennæ and the proboscis black, palpi brown, its scales chiefly concolorous, no cluster of white hairs or scales at their apices; narrow scales of middle of occiput golden yellow, the upright ones chiefly black, sides of occiput covered with depressed whitish scales and with a small cluster of black ones; thorax reddish brown, scales of mesonotum golden yellow, becoming pale yellow in front of the scutellum and on the pleura; abdomen black, its scales black, except a crossband of yellowish white ones at base of each segment, the bands considerably narrowed at the middle, similar scales scattered over the sixth and nearly the whole of the seventh segment and along apices of the two preceding segments; legs yellow basally, becoming brown on the tibiæ and tarsi, scales of femora chiefly pale yellow, of the tibiæ mostly black, those on the hind side pale yellow, on the bases of the tarsal joints whitish, those on the second joint of the hind tarsi covering about one-fourth the length of the joint, front tarsal claws toothed; wings hyaline, lateral scales of the veins long and narrow, hind crossvein nearly its length from the small crossvein, petiole of first submarginal cell from one-half to four-fifths as long as the cell; length, 4 mm. One specimen bred May 6, by Mr. LaRue Holmes.

Habitat.—Summit, New Jersey.

I have also examined 8 females and as many males, bred by Prof. J. B. Smith, from the salt-marshes of New Jersey. In the male the scales of the palpi are black, those of the under side and at bases of the last two joints yellowish white, no whitish band at base of the antepenult joint.

Prof Smith informs me that the larva is readily separated from that of *sylvestris*.

Culex aurifer, new species.—Female. Near *triseriatus*, but the scales on sides of mesonotum golden yellow instead of white, and the venter is without crossbands of black scales. Black, the halteres, coxæ and femora largely yellow; scales and hairs of palpi brown, scales of occiput golden yellow, the upright ones brown; scales in middle of mesonotum brownish black, those on the sides and many in front of the scutellum golden yellow, those of pleura pale yellow; scales of abdomen black, those on the venter pale yellow, sometimes encroaching a trifle on the dorsum,

hairs of the first segment and at the apices of the others pale yellow; scales of femora and on posterior side of tibiæ pale yellow, remaining scales of tibiæ and those on the tarsi black, front tarsal claws toothed; wings hyaline, lateral scales of the veins long and narrow, hind crossvein about its length from the small crossvein, petiole of first submarginal cell three-fifths the length of the cell; length, 4.5 mm.

Three specimens, collected June 22 and 25, by Dr. H. G. Dyar.

Habitat.—Centre Harbour, N. H.

I have also examined two males and two females from Lahaway, N. J., bred by Dr. J. B. Smith, who writes that the larva is very different from that of *triseriatus*. The adult male is similar to the female except that the hairs of the palpi are chiefly whitish, and the dorsum of the abdomen has several yellow scales on the apical half.

Culex nanus, new species.—Female. Near *jamaicensis*, but much smaller, the light-coloured scales on the tibiæ not collected into spots, mesonotum without round spots of yellowish scales, etc. Black, the base of the antennæ except the first joint, a band at middle of proboscis, the halteres and bases of femora yellow; scales and hairs of palpi black, appressed scales of occiput golden yellow, the upright ones black, scales of mesonotum golden yellow, those of the abdomen black and with a broad crossband of whitish ones on the hind margin of each segment, the last two segments nearly wholly whitish scaled; scales of venter white, those of femora and tibiæ mixed black and whitish, the latter forming a ring near three-fourths the length of each femur, scales of tarsi black, those at narrow bases of the joints whitish, tarsal claws simple: wings hyaline, the scales mixed black and white, the black ones not collected into spots, lateral scales of the anterior veins narrowly lanceolate, those of the other veins almost linear; length, 3 mm Four specimens collected at Key West, Florida, in August, 1901, by Mr. August Busck, and six by Mr. E. A. Schwarz, April 1 to 3, 1903.

Type.—No. 6893, U. S. National Museum.

Culex discolor, new species.—Female. Differs from the above description of *nanus* as follows: palpi with a cluster of white scales at the apices, upright scales of occiput yellow, whitish crossbands of abdomen prolonged forward in the middle, crossing or almost crossing the segments, scales on posterior side of front and middle tibiæ and on anterior side of the hind ones almost wholly pale yellow, first tarsal joint bearing many yellow scales, black and yellow scales of wings not evenly distributed, the

black ones forming a distinct spot at forking of the second vein with the third, another on upper branch of fifth vein at the hind crossvein, and a third on the apical third of the last vein, remaining scales of this vein wholly yellow; length 4 mm. A specimen from Delair, New Jersey, received from Prof. J. B. Smith.

Type.—No. 6894, U. S. National Museum.

CORRECTIONS AND NOTES ON DR. DYAR'S LIST OF NOCTUIDS.—II.

BY A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

Page 99. *Apatela*. As might have been expected from the inconspicuous markings and uniform gray colour of the moths, the identifications of species of *Acronycta*, described by Walker and Guenée, have proved difficult and often contradictory. I am now inclined to waive all objections and accept Dr. Dyar's list as it stands. The only point I make is, the difficulty I have in believing that, having identified *xyliniformis*, Guen., already and originally for Riley, I should have redescribed specimens at a later period as *pallidicoma*: it seems to me yet possible that two forms are here "mixed up," although I know *xyliniformis* to be inconstant.

106. *Fragilis* having been transferred to *Apatela*, *diphteroides* becomes type of *Microcoelia*. Guenée writes *Diphtera*, following Ochsenheimer. Hübner originally wrote *Diphthera*, which is the correct Greek form.

107. The generic term should read "*Cyathissa*," not "*Cyathisa*."

112. This genus should be called *Monodes*, Guen., type *nucicolora* (r. *nucicolor*); the type of *Oligia* being *strigilis*.

113. *Crasia*, Auriv., 1891, Staud. and Rebel, 295, is a synonym of *Hillia*, Grote, 1883. According to the European catalogue *iris*, Zett., is an older name for the variable species.

121. The genus is "*Momaphana*," not "*Momophana*."

120. No. 1267. The name *illepida* should be preferred, since the type of *diversilineata* had patched wings and the species is irrecognizable from this description, and the identification of the type uncertain.

124. As I have shown in these pages, the citation to *Pseudanarta* of Hy. Edwards is spurious. There is no such name in Proc. Cal. Acad. Sci., Pac. Coast, Lep., Nos. 1 to 22.

132. *Blanda*, cited, I believe, wrongly under *Metalepsis*, is repeated in the right place on page 178 under *Pseudoglaea*. It should be struck out here.

138. Prof. Smith is responsible for the confusion in the name of this common species. *Subgothica* of Stephens is = *jaculifera*, Guen. The original *subgothica* of Haworth is claimed as British by Tutt. In the meantime Slingerland says *subgothica* of Haworth is *tricosa*, Lintner. My original determination should not have been altered. But whether *jaculifera*, Guen., *tricosa*, Lintner, and *herilis*, Grote, which I still claim as the correct scientific names for the three forms (leaving out Haworth's variously interpreted name entirely, for the sake of clearness and precision) are distinct species and not forms of one, seems not definitely known.

140. The new name *Paragrotis* is unnecessary. *Carneades* being preoccupied, the genus should be called *Pleonectopoda*, with the type *Lewisi*, which has in any way priority. In the meantime I cannot but believe the genus must be represented in Europe, and that some Hübnerian name will eventually be found for it. Others of our American names at expense of *Agrotis*, Lederer, may be found in the same case.

149. It should be *aratrix*, not "*atratrix*."

150. From photographs and descriptions, I cannot believe that Prof. Smith's *profundus* and *obscurus* are distinct species from our eastern *Anytus sculptus*.

154. At length the dispute as to *comis* is decided in my favour, and the type is therefore not "like typical *olivacea*, but so spread that the insect appears more plump, shorter winged and differently marked"! It now appears that after having disposed of my species in this manner, Prof. Smith has redescribed the form or species five times, thus affording ample proof of the incorrectness of the original statement. Time, as Mr. Strecker used to say, at length sets all things even.

157. Instead of *Neuronia* (preocc.) it would appear that *Epineuronia*, Rebel, should be used for No. 1883.

167. The term *Acerra* with the type *normalis* should be used here as being more correct and also earlier published than *Stretchia*, described as a notodont, and which I regard as a synonym of

Perigrapha, Led. I am not agreed with the reference of *muricina* to *plusiiformis*, but I have no material of the former to compare.

173. For *Asteroscopus*, Boisd. *Brachionycha*, Hübn., should be used ; see Staud. & Rebel, p. 181, l. c.

177. *Xanthia*. The type is *paleacea*. According to Staud. & Rebel, 207, the species cited as "*flavago*," No. 2199, should be called *lutea*, Ström.; it belongs to *Citria*, Hübn. From the photograph *pulchella* belongs to *Orthosia* ; this specific name is too often used. *Puta* is same as *Orthosia euroa*.

181. Morrison sent me *apiata* as "*Glæa*, n. s.," Bull. B. S. N. S., 211, 1875. It was not type of *sericea* which I noted, Bull. Brklyn Ent. Soc., 37, 1880, but a spec. of *venustula* so named. But Morrison's original description cannot well apply to a *Glæa* at all, as elsewhere shown by me. At any rate *venustula* is being called *sericea*.

No. 2183. The authority should read Grote, not Grote & Robinson.

2197. I regard *angulata (exprimens)* as a distinct species.

Page 178. It is my fault that *Trigonophora* is here used. The genus should be *Habryntis*, Lederer, 1857. I have a specimen of the green *H. scita*, which shows an orange-brown tinting, and recalls thus more nearly the American species.

179. For "*Cosmia*, Ochs," read *Xanthia*, Hübn.

No. 2222. I prefer *ferruginoides* for the species and *bicolorago* for the variety, since this arrangement brings the forms into correspondence with the original descriptions. It ought to make no difference which stands first on Guenée's page. The important point is, that the name is sustained by the original description, which should always be looked up, and is the only basis and warrant for the application of the name.

2354. *Arcifera* is a dimorphic ♀ form of *Spraguei* ; a similar variation is shown by *brevis* and *atrites*. I figure both sexes of *Spraguei* with yellow hind wings. I wonder how many times more I must repeat this. I have never seen a male *arcifera* with black secondaries.

2358. I think *mortua* might stand as an immaculate form of *Packardii; nobilis* merely has the lines more distinct than the latter, better written.

2617. For "*pentia*" read *penita*.

2650. For "*lixivia*" read *lixiva*.

2696. I draw attention to my papers in CAN. ENT., Vols. IX. and XI. I believe the three forms here cited to be distinct. I refer *tortricina* to *Spragueia*. *Fruva fasciatella* and *obsoleta* appear to differ in the structure of the front as well as in ornamentation. The Californian *acerba* is near *fasciatella*. I do not know who is responsible for the present jumble. If these forms are not kept separate they will inevitably be described over again.

A NEW ŒCANTHUS FROM ILLINOIS.

BY E. S. G. TITUS, WASHINGTON, D. C.

Œcanthus Forbesi, n. sp.— ♂. General colour pale yellow. Length to tip of wings 17 mm.; greatest width across closed wing-covers, 3.5 mm. Very slender, elongate in general shape, somewhat resembling *Zabea bipunctata* (DeG.), but the outline of the closed wing-covers is more elongate.

Face rather more elongate than in other species in the Œcanthinæ; *maxillary palpi* 5-jointed, *first* and *second* short, broadened at tips; *third* slender, elongate, as long as fourth and fifth united; *fourth* slightly clavate, distinctly constricted at the middle; *fifth* shorter than fourth, elliptical, elongate, and very dark; all the joints pubescent; *labial palpi* with *first* joint short; *second* ⅓ longer; *third* slightly longer than second, obliquely truncate at tip and very slender at base. Eyes reddish-brown. Antennæ filiform, almost as long as the body; all the joints except basal two alternately equal in length up to 20th joint (except also the fifth, it being slightly elongate), 12–15th joints not elongated. First basal joint with a broad longitudinal black stripe on the inner side beneath, and a slight trace of a brownish horizontal line near the apex on the outside; second joint with two longitudinal parallel black lines beneath. This joint and those following have each at their apex, beneath, a brown line.

Thorax elongate, narrower anteriorly; sides deflexed, with their lower margins slightly reflexed. Wing-covers flattened, very narrow; wings ⅓ longer than covers. Hind legs long and slender, their tibiæ armed with six pairs of medium spines, all tipped with black. All the tarsi and claws black. Abdomen quite dark beneath.

Male cerci reaching almost to tip of the wings.

Habitat.—Urbana, Ill., September; C. H. Hart.

This differs from typical *Œcanthus* by not having maxillary palpi with last three joints elongate, subequal, and last joint excavated at tip beneath; from *Zabea* by not having fifth joint of maxillary palpi longer than third and fourth very short. It can easily be separated by the antennal characters noticed above from other species in the subfamily (*Œ. argentinus* and *Œ. californicus* not seen.)

In all other species examined there were several joints between the second and twentieth of the antennæ that were much elongated.

This species was first noticed by the author when classifying the species of *Œcanthinæ* in the Ill. State Laboratory of Nat. History, for the purpose of making some food studies in the group. It is described at the request of the Director of the Laboratory, Dr. S. H. Forbes, in whose honour I have named the species.

NOTES ON CULEX KELLOGGII, THEOBALD.

BY D. W COQUILLETT, WASHINGTON, D. C.

In the CANADIAN ENTOMOLOGIST for August, Mr. Theobald described a *Culex Kelloggii* as new; the description agrees well with the specimens on which I founded *Culex tarsalis**, and undoubtedly refers to the same species.

My specimens were from the same lot as the one which Dr. Williston described as *Culex*, n. sp.†, to which description Lieut. Giles applied the name of *Culex Willistoni*, n. sp.‡; the latter name is therefore also a synonym of *tarsalis*.

On page 25 of the Kansas University Science Bulletin, June, 1903, Mr. C. F. Adams described a *Culex affinis*, n. sp. (not of Stephens, 1825), which is evidently founded on a somewhat abraded specimen of *tarsalis*.

The synonymy at present is therefore as follows:

CULEX TARSALIS, Coquillett, 1896.
Culex, n. sp., Williston, 1893.
Culex Willistoni, Giles, 1900.
Culex affinis, Adams, June, 1903.
Culex Kelloggii, Theobald, August, 1903.

*Can. Ent., Feb., 1896, p. 43.
†North American Fauna, No. 7, May 31, 1893, p. 253.
‡Handbook of Gnats or Mosquitoes, 1900, p. 281.

EUTHRIPS AND HEDYCHRIDIUM IN NEW MEXICO.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. MEX.

Thripidæ.

Euthrips tritici (Fitch.).—At Las Vegas, Hot Springs, N. M., on May 17, 1903, I found *Ribes cereum*, Dougl., presenting numerous flower-galls of rather pumpkin-like form and greenish-white colour, about 9 mm. long and 8 broad. These consisted of the swollen and deformed flowers, the walls of the calyx being thickened and greatly inflated. I rather expected to find in them dipterous larvæ, but they contained nothing but thrips, which, I am sure, is responsible for the damage. After careful comparison with the published accounts, and especially that of Mr. W. E. Hinds, I am quite unable to separate the thrips from the well-known *Euthrips tritici*.

Chrysididæ.

Hedychridium amabile, sp. n.—Length about 3 millim., shining green and crimson. Head yellowish green, the vertex crimson, shading into yellow; antennæ black; thorax green, the pro- and mesothorax mostly crimson dorsally, the crimson shading into golden at the sides; scutellum suffused with the same colours; sides of post-scutellum, and hind corners and narrow hind border of prothorax, more or less brilliant blue; abdomen yellowish-green shot with crimson. Ocelli in a not far from equilateral triangle; prothorax and mesothorax, seen from above, about equal in length; prothorax with large, close subconfluent punctures; mesothorax with well-separated punctures of various sizes; triangular area at base of metathorax with no median ridge, the area is minutely transversely ridged, except at the lateral corners, where the ridges run obliquely; sides of metathorax irregularly cancellate; abdomen very closely punctured, third segment without any fovea or peculiarity of sculpture; legs dark, basal half of tarsi light reddish. When the abdomen is viewed laterally, the apex of the second segment is level with the base of the third.

Hab.—Mesilla Park, N. M., on campus of Agricultural College, May 8, 1900. *(Cockerell).* A lovely little species, known from others by its metathoracic sculpture.

I will take this opportunity to record *Chrysis inflata*, Aaron (det. du Buysson), from the Wiegand Ranch, near Las Vegas, N. M., March 1. With this the recorded New Mexico Chrysididæ now number 19 species.

TWO NEW PTINIDÆ.

BY C. SCHAEFFER, MUSEUM OF THE BROOKLYN INST. OF ARTS AND SCIENCES.

A number of new species, either entirely new or known only from Mexico or Central America, have been brought back by me from the lower Rio Grande. The description of these new species, together with a list of the species known to occur in that region, will be published by me in the Bulletin of the Museum of the Brooklyn Inst. of Arts and Sciences. The two following species are here described in advance, in order that they may be included in the revision of the Ptinidæ on which Prof. Fall is at work.

The types are in the collection of the Museum of the Brooklyn Institute of Arts in Sciences.

Trichodesma Texana, n. sp.—Cylindrical oblong, form of *sordida*, black, twice as long as wide, with white and fulvous recumbent pubescence, intermixed with longer erect hairs. Antennæ brown, last three joints longer than the preceding. Head black, densely granulated, pubescence white, intermixed with fulvous. Thorax broader than long, sides arcuate in front, sinuately narrowing to the hind angles, disc gibbous, hardly sulcate at the gibbosity, surface granulate and densely clothed with white and fulvous short recumbent hairs, intermixed with longer erect hairs, gibbosity with four black spots, two at the summit and two below these, no brush-like tufts. Elytra as broad as the thorax at middle, regularly striate, with coarse, deep, closely-placed punctures, very densely clothed with white recumbent pubescence, reaching nearly to the apex, terminated by a few black spots; apex sparsely clothed with fulvous pubescence. Body beneath black, shining, with dense gray pubescence.

Length, 4–5 mm.

Esperanza Ranch, near Brownsville, Tex.

This species seems to be very near *T. albina*, Gorh.*, but, judging from the description and figure, is distinct from it. All the specimens I have taken are quite constant, except in the distinctness of the hind angles. These are in some specimens distinct, and the sinuation before them is very pronounced, in others the angles can be called rounded, in these the sinuation is much less pronounced.

*Biol. Central. Americana, Vol. III., part 2, p. 199.

Trichodesma pulchella, n. sp.—Oblong, slightly more robust than *gibbosa*. black, with very short brown recumbent pubescence, intermixed with longer erect hairs, sides of thorax, base of elytra, a narrow strongly dentate median band and apex with a denser white pubescence. Antennæ brownish, last three joints as long as the preceding. Head black, with not densely-placed granules, clothed with white pubescence, denser at apex. Thorax broader than long, sides arcuate in front, slightly to the hind angles, which are almost rounded, disc gibbous behind, slightly sulcate from the apical margin to the summit of gibbosity, surface distinctly granulate, clothed with dense, very short hairs, white at sides and apex, light brown at middle, without brush-like tufts at gibbosity. Elytra as wide as the thorax at middle, surface with irregular, closely-placed, coarse, deep punctures, clothed with very fine, short recumbent brownish hairs, a band at base, a narrow, sharply dentate median fascia and apex of dense white pubescence. Between the median fascia and the white apical space near the suture is a white longitudinal streak on each elytron, reaching to the apical space and terminated by a black spot. At the apex of the white basal band is also a black spot on each side. Body beneath black, shining, densely pubescent, with short, fine gray hairs.

Length, 5.5–7 mm.

Esperanza Ranch, near Brownsville, Tex.

A number of this beautiful species I obtained by beating ebony, but it occurred on different other trees also, but rarely. A few specimens of a species which I take to be *T. sordida*, Horn, were taken at the same place.

CULEX CONSOBRINUS: A REJOINDER.

BY J. M. ALDRICH, MOSCOW, IDAHO.

In the August number of this journal, Mr. Coquillett has given his reasons for not accepting *Culex inornatus* as the proper name for the species which he has called *C. consobrinus*. He bases his claim for the name *consobrinus* on a supposed error of Desvoidy's in the indentification of *pipiens*, relying on the length mentioned, 3 lines, as proof that Desvoidy's species could not have been the real *pipiens*. My own article on the subject, in the July number, had intimated that Desvoidy had erred in the measurement given. Since then I find that Theobald (Mon. Culicidæ, II.: 135) gives 6 mm. as the maximum length of *pipiens*; this, of course, is equivalent to Desvoidy's 3 lines.

The locality given by Desvoidy, "Pennsylvania," is not of great significance, as it was not uncommon for the older entomologists to assign this locality to material received from Philadelphia, even if not collected near there. It is Osten Sacken, I think, who in one place instances a species published with the locality Philadelphia, which has not since been taken except in Texas.

Considering the facts brought out in this discussion, it is clear that nobody knows, or can know, what *consobrinus* is. Whether a sufficient probability has been adduced to justify the use of the name, is a question upon which entomologists may differ; as before, I think the name should not be used. A much larger problem is involved here than the name of a single species. The use of old names which are of more or less doubtful application has been overdone in the Diptera in recent years, in my opinion. The idea that we must "do something" with all the old names seems to me unscientific. Rather we should try to follow the rule of not using a name unless we know that it stands for something. The difficulty of harmonizing the practice of entomologists arises from the fact that there is no definite criterion in most cases, and the decision rests on the "entomological sense" of the person making it; what is convincing to one will not be to another.

I have not the slightest interest in saving the name *inornatus* from synonymy, except from the fact that it is the only name which is positively known to apply to the species under consideration. I doubt if the species could be recognized from the description; but in this case we have the type in the U. S. National Museum, examined by Mr. Coquillett and found to be this species.

I have in my previous article explained why *impatiens* and *pinguis* cannot be used for this species. Mr. Coquillett seems to argue that either name is available unless somebody can disprove it; my position is that affirmative proof is necessary.

Miss Alice L. Embleton, of Newnham College, Cambridge, England, has been awarded the Royal Society's Mackinnon Studentship in Biology, the object of which is to encourage scientific research in any department in this great field of natural science. She has decided to confine her investigations to the parasites of destructive insects, in the hope that she may be rewarded with discoveries of great economic importance by finding natural enemies of greater efficiency than any artificial insecticides. It is much to be hoped that she may prove a worthy successor of the late Miss Eleanor Ormerod.

BOOK NOTICE.

A Catalogue of the Coccidæ of the World.—By Mrs. Maria E. Fernald, A.M., Amherst, Mass. Special Bulletin (No. 88) of the Hatch Experiment Station of the Massachusetts Agricultural College, 1903. One Vol., 8vo., pp. 360.

The authoress gives us in this volume a most valuable and complete catalogue of the Coccidæ of the World, the results of nearly twenty-five years of patient and careful labour. No one who has not attempted work of this kind can form any idea of the difficulties of the task, the immense number of publications to be gone over, the care and accuracy that are required and the systematic methods that must be adopted, and consequently few estimate as highly as they should the gratitude that is due to one who spends years of toil in making the way easy for all future students in the particular department of natural science that is taken up. The classification of the Coccidæ has long been in a somewhat chaotic condition; the present work will help very materially in reducing the confusion and bringing out order and system instead. Mrs. Fernald does not expect entire agreement with her conclusions, but we venture to think that few will endeavour to criticise her work, inasmuch as it has been done with such care and freedom from prejudice. In every case where changes in nomenclature are made the history of the genus or species is given by means of the full bibliographical references, and the evidence seems complete. No less than 1514 species are listed, and of each one bibliographical references are given, with the geographical distribution and food-plants when known. The volume is well and clearly printed, and its value is much enhanced by the very full index to species as well as genera with which it closes.

A Coleopterous Conundrum.—There has been so great a desire to obtain specimens of the remarkable beetle described by Mrs. Slosson in the May number of this magazine, that she is compelled to say that she has only a few examples left and is unable to give away any more.

Dr. Dyar, in his zeal for the laws of priority, contends that the name jocularly given to the insect by Mrs. Slosson (*Ignotus aenigmaticus*) should be taken as founding a new genus and a new species. This seems absurd, when there was no attempt made to give a scientific description of the creature, and the authoress says expressly that she merely applied the name "sometimes, in chat over her discovery!"

Mailed September 4th, 1903.

The Canadian Entomologist.

VOL. XXXV. LONDON, OCTOBER, 1903. No. 10

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The fortieth annual meeting of the Society was held at Ottawa on the 3rd and 4th of September. On the former day a meeting of the Council for the transaction of business was held in the morning; in the afternoon reports were read from the various Branches, Sections and Officers of the Society, as well as several papers of an interesting character. In the evening a public meeting was held in the Assembly Hall of the Normal School, at which the President, Professor Lochhead, read his annual address. He was followed by Dr. L. O. Howard, of Washington, United States Entomologist, who gave a very clear and most interesting account of the transmission of yellow fever by mosquitoes. The second day was occupied with the reading and discussion of papers, the election of officers and the examination of a number of specimens brought by the members. A full account of the proceedings will be given in the Annual Report of the Society to the Legislature of Ontario.

The following were elected officers for the ensuing year:

President—Professor William Lochhead, B. A., M. S., Ontario Agricultural College, Guelph.

Vice-President—J. D. Evans, C. E., Trenton.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors: Division No. 1—C. H. Young, Hurdman's Bridge.
Division No. 2—C. E. Grant, Orillia.
Division No. 3—J. B. Williams, Toronto.
Division No. 4—G. E. Fisher, Freeman.
Division No. 5—R. W. Rennie, London.

Directors Ex-officio (ex-Presidents of the Society)—Professor William Saunders, LL.D., F.L.S., F.R.S.C., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., London; James Fletcher, LL.D., F.L.S.; F.R.S.C., Entomologist and Botanist of the

Experimental Farms, Ottawa; W. H. Harrington, F.R.S.C., Ottawa; John Dearness, B.A., Vice-Principal Normal School, London; Henry H. Lyman, M.A., F.R.G.S., F.E.S., Montreal: Rev. T. W. Fyles, D.C.L., F.L.S., South Quebec.

Librarian and Curator—J. Alston Moffat, London.

Auditors—W. H. Hamilton and S. B. McCready, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee — Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; Professor Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. A. Balkwill and W. E. Saunders, London.

Finance Committee—Dr. Bethune, J. Dearness and the Treasurer.

Committee on Field Days—The Chairmen of the Sections and Dr. Woolverton, Messrs. Balkwill, Bowman, Law, Moffat, Rennie and Saunders, London.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Bowman, Dearness, Moffat and Saunders, London.

A NEW BOMBUS FROM COSTA RICA.

BY J. C. CRAWFORD, JR., WEST POINT, NEBR., AND MYRON H. SWENK, LINCOLN, NEBR.

Bombus leucomelas, n. sp.—♀. Black, with deep black pubescence, except that on anterior half of mesothorax, which is grayish, tipped with black, and on abdominal segments 3–6, which is pure white; clypeus arched, weakly and very sparsely punctured; labrum basally with two widely separated tubercles; joint 1 of flagellum equal to 2 and 3 together; wings deeply infuscated, iridescent; basal joint of hind tarsi not pointed at apex; pubescence of legs black. Length 21–22 mm.

☿. Similar to ♀, but much smaller, the third abdominal segment with black pubescence, the clypeus more strongly punctured. Length, 10–14 mm. ♂. Unknown.

One ♀, Cartago, June, 1903; one ♀, Volcano Irazu, February 22, 1902; four ♀♀, Monte Redonda, March 3, 1902.

Near to *B. funebris*, Sm., from which it differs in its larger size, the pubescence of the mesothorax not snow-white on the disc, and the third abdominal segment not black.

NOTES ON THE NORTH AMERICAN SPECIES OF ISODONTIA, PATTON, WITH DESCRIPTIONS OF A NEW SPECIES AND VARIETY.

BY H. T. FERNALD, PH. D., AMHERST, MASS.

The North American species of Isodontia may be distinguished by means of the following table:

1. Mandible with two teeth (anterior tooth sometimes partly divided) . . 2.
   Mandible with three teeth . . . . . 7.
2. Petiole black . . . . . 3.
   Petiole yellow . . . . . *exornata*, n. sp.
3. Third segment of antenna longer than seventh or eighth . . . . . 4.
   Third segment of antenna shorter than seventh or eighth . . . . . 5.
4. Median segment above with long white hairs . . . . . *macrocephala*, var. *cinerea*, n. var.
   Median segment above without long white hairs . . . *macrocephala*, Fox.
5. Body hairs gray . . . . . 6.
   Body hairs black . . . . . *azteca*, Sauss., var.
6. Front part of wings fuscous . . . . . *azteca*, Sauss.
   Wings entirely fuscous . . . . . *azteca*, Sauss., var.
7. Legs more or less yellowish . . . . . 8.
   Legs black . . . . . *apicalis*, Sm.
8. Abdomen black . . . . . *tibialis*, Lep.
   Abdomen more or less yellowish . . . . . *elegans*, Sm.

I am hardly prepared at present to accept *Isodontia elegans*, Smith, as a variety of *I. apicalis*, Smith. The differences between the two seem to be very constant, and their distribution appears to be somewhat different, *elegans* being more a southern and western form, while *apicalis* occurs chiefly in the central, eastern and northern States.

Patton (Proc. Ent. Soc., Wash., III., p. 46) regards *macrocephala*, Fox, as a synonym of *azteca*, Sauss. With this I am unable to agree, all the specimens of a large series of both of these species before me being distinguishable almost at a glance. The type specimen of *macrocephala* has the anterior tooth of the mandible with a groove dividing it into two portions, which leads me to believe that in this insect the mandible was originally three-toothed, but that the anterior two have partially fused. All my specimens of *azteca*, on the other hand, indicate an originally two-toothed mandible, and though the anterior tooth is blunt in many cases, it

shows no trace of any longitudinal groove, such as is present in the type of *macrocephala*. However, the length of the third segment of the antenna as compared with that of the seventh or eighth in the two species should be sufficient to show that the two are not identical in any case.

Isodontia apicalis, Smith, has sometimes been considered as a synonym of *Sphex philadelphica*, Lep., but I regard this as based on insufficient evidence. Lepeletier's description gives no characters which would place it in the more recent genus *Isodontia*, and in two points differs from what has been commonly considered that species. Lepeletier says (Histoire Naturelle des Insectes, Hymenopteres, III., p. 340): "Thorax niger, nigro villosus," and "tarsorum quatuor anticorum articulo extremeo ferrugineo." None of the many specimens of what has been considered this insect which I have examined agree in these points with this description. An attempt to locate the type in order to settle the matter has proved a failure. The insect was in the Serville collection, and this is not at the Museum d'Histoire Naturelle at Paris, and Monsieur R. du Buysson writes me: "Ils ont dû être vendus et séparés dans beaucoup d'autres collections. Actuellement l'on ignore où ils se trouvent." I may add that Dr. F. Fr. Kohl, of Vienna, who has given much study to this group, writes me: "Wahrscheinlich ist Sph. philadelphicus Lepeletiers *gar keine* Isodontia."

Under these conditions it seems best to apply Smith's name—*apicalis*—to this insect, at least until Lepeletier's type shall be found.

Isodontia exornata, n sp.

Head: clypeus somewhat arched laterally, with a faint median carina most pronounced posteriorly, sometimes not perceptible; anterior edge slightly prolonged laterally, with a slight notch at the middle; surface covered sparsely with yellow hairs. Clypeus and frons to level of insertion of antennæ golden pubescent. Mandibles two-toothed, black at base and tip; elsewhere ferruginous. Eyes somewhat nearer at the clypeus than at the vertex. Antennæ, first six to eight segments ferruginous, terminal segments black; scape bearing a few yellowish hairs; third segment longest. Head with scattered punctures and sparsely covered with long yellowish hairs. A narrow, yellow pubescent band just behind the eye.

Thorax: collar faintly punctured, clothed with scattered yellow hairs; its dorsal edge and the posterior edge of the prothoracic lobe golden pubescent. Mesonotum black with yellow hairs, rather coarsely

punctured and with a short median, unpunctured groove extending about one-third its length from its anterior edge. A small, somewhat triangular spot of golden pubescence is situated on the pleuron just posterior to the prothoracic lobe, and sometimes a smaller one occurs between this and the wing attachment. Tegulæ smooth, pale yellow. Mesopleura and sternum covered sparingly with long yellow hairs. Scutellum black, punctured, the punctures rather more scattered than on the mesonotum; on each side just mesad to the attachment of the hind wings is a golden pubescent spot. Postscutellum covered by golden pubescence. Median segment coarsely punctured, on each side a golden pubescent band passes from the front edge just lateral to the edge of the pubescence on the postscutellum backward below the stigma to the posterior coxa. Just above the base of the petiole is a golden pubescent spot.

Abdomen: petiole slightly curved, ferruginous yellow, somewhat darker at the base beneath, covered with yellowish hairs; its posterior portion yellowish pubescent. Base of abdomen above, yellowish, remainder black, the hinder edges of the segments, however, dull yellowish; surface finely pale pubescent. A few hairs scattered over the more posterior segments. Beneath, minutely punctured, with scattered hairs in the female, in the male with a cross row of black hairs on each of the last three or four segments. Legs: coxæ, trochanters and proximal part of femora black, hairy, remainder ferruginous. Sometimes a yellowish pubescence is present on the coxæ and trochanters. Tips of claws nearly black. Spines dark ferruginous. Posterior tibiæ yellow pubescent behind. Wings smoky, with a slight violet reflection.

Length, 16–20 mm. Wing expanse, about 30 mm.

Described from five male and two female specimens from Indian River and Biscayne Bay, Fla., and from N. C. and Ga. Types have been deposited in the collections of the National Museum at Washington, American Entomological Society at Philadelphia, Massachusetts Agricultural College, Amherst, Mass., and of Mr. W. H. Ashmead, Washington, D. C.

Isodontia macrocephala, var. *cinerea*, n. var.

This variety differs from the typical form only in the fact that the thoracic hairs are longer and whiter, giving the insect a noticeably gray appearance very different from that of the typical form, which is glossy black, the few gray hairs not modifying this, and, in fact, being generally overlooked unless the body is closely examined.

EUCORETHRA, A GENUS OF CULICIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Eucorethra, Underwood.*

Intermediate between *Corethrella* and *Sayomyia*, having the antennæ 14-jointed, as in the former, but the spaces between the verticels almost bare, as in the latter; differing from each in the much shorter second joint of the antennæ, which is only slightly longer than wide. Antennæ of male rather robust, submoniliform on the basal half, the first six joints only slightly longer than wide, the remaining joints increasing in length and decreasing in diameter toward the apex, the antepenult about half as long as the penult, verticels composed of numerous very long bristly hairs except on the last joint; antennæ of female nearly cylindrical, the joints gradually increasing in length to the apex, scarcely thickened at the insertion of the verticels, which consist of a few rather short bristly hairs; proboscis about one and one-half times as long as height of head, palpi inserted near three-fourths of its length, 4-jointed; first tarsal joint much longer than the second; venation as in *Culex*. Type, the following species:

Eucorethra Underwoodi, Underwood.

Black, the bases of antennæ, of wings, stems of halteres, coxæ, femora except their broad apices, and the tibiæ, yellow; thorax gray pruinose and marked with three velvet black vittæ, the median one extending from the front end to slightly beyond the middle, and divided lengthwise by a gray line, the lateral ones reaching from the hind end of the mesonotum nearly to the suture; abdomen somewhat polished, its hairs yellow; hairs of legs chiefly black, those at apices of femora and tibiæ golden yellow, tarsal claws of female with a single tooth near the base, those of the male with an additional tooth near the middle; wings hyaline, a large brown cloud on veins at apices of first and second basal cells, at base of second vein, of first submarginal and second posterior cell, hairs of veins black, small and hind crossveins interstitial, petiole of first submarginal cell three-fourths as long as that cell, petiole of second posterior cell noticeably longer than the cell; length, 8 mm. A specimen of each sex bred at Kaslo, British Columbia, June 23 and July 8, by Dr. H. G. Dyar. Type, No. 6925, U. S. National Museum.

I have also studied a female specimen bred March 1, by Prof. W. L. Underwood, of the Massachusetts Institute of Technology, after whom the species is named, in recognition of his first discovery of this interesting form. Prof. Underwood's specimens were obtained in the woods of Maine.

*Science, August 7th, 1903, page 182.

THE LIFE-HISTORY OF MAMESTRA LAUDABILIS, GUENEE.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The eggs of this species were received from the Rev. R. W. Anderson, of Wando, North Carolina. They hatched May 22, and the larvæ were matured by the middle of July. The larvæ are coloured to resemble a piece of wood or bark, and remain all day motionless, hidden on the ground. They are remarkably sluggish, can be handled freely for a considerable time without making the slightest motion. They are general feeders.

Egg.—Shape of two-thirds of a sphere, somewhat flattened. About 24 sharp, vertical ribs, diminishing in number by alternation towards vertex, waved, joined in a ring around the micropyle; cross striæ distinct, about like the ribs, forming a large, coarse reticulum. Whitish, with a broad, irregular dark-red ring and vertical spot, partly confluent. Diameter .6 mm.

Stage I.—Head slightly bilobed, shining brownish black, mouth broadly pale luteous, jaws red-brown; width about .3 mm. Body robust, short and stout, normal, joints 5 to 7 slightly arched, feet of 7 and 8 shorter than the others, but distinct. Pale whitish, tubercles small, black, but strongly raised. Setæ long, pale and distinct. Cervical shield black, angularly shaped, containing four raised pale tubercles. Later the cervical shield and tubercles are black except a lateral pale patch; anal plate defined by black; leg shields faintly dusky. Still later there appear narrow dorsal and subdorsal white lines.

Stage II.—Head rounded, apex in joint 2, shining brownish black, mouth paler; width about .5 mm. Body robust, equal, normal. joint 12 not enlarged; shields not differentiated. Olivaceous gray, paler in curved bands in the incisures; a faint, pale, subdorsal line edged below with blackish; stigmatal band broad, whitish. Tubercles black, moderate; setæ stiff, long, dark, curved backwards. Later brownish-gray, the dorsum checkered with blackish X-marks intersegmentally.

Stage III.—Head pale brown on face, vertex broadly sooty black with a bar running down a little way on each lobe before; width about .7 mm. Body robust, joint 12 not enlarged. Wood-brown, dorsal line white, narrow, subobsolete, dorsal space tessellated with intersegmental

X-marks of grayish-black, more solidly filled on thorax. Subdorsal line white, straight, distinct, filled in below with black to a waved, narrow, white, lateral line. Subventer gray shaded. Tubercles black, not raised; setæ coarse, pale.

Stage IV.—Head brown, obscurely mottled, a broad, curved, black band on face of lobe and spot on eye; width 1 mm. Body flattened, sluggish in habit, setæ stiff, curving alternately forwards and backwards; no shields; joint 12 not enlarged. Pale wood-brown, the dorsal smoky lattice-work obscurely cut by faint, pale, broken dorsal line. Subdorsal line concolorous with the ground, narrowly edged with blackish above. Sides black shaded; stigmatal region broadly pale; subventer and venter black shaded. Tubercles small, black. Skin granular spinulose.

Stage V.—Head pale brown, the clypeus and vertex darker; reticulations and curved band dull black; width 1.8 mm. Body flattened, squarish, densely papillose granular; setæ short, thick, broadly clavate; joints 12 and 13 dorsally folded, elevated. Light brown, brokenly reticulated in black, dorsal diamond-shaped lattice dark brown; subdorsal line straight, pale, of the ground colour, edged with black, forming triangular, segmentary velvety patches on a gray-black ground laterally. Substigmatal band of ground colour, broad, sharply edged, undulate; subventer blackish shaded. Feet pale. Tubercles small, black.

Stage VI.—Head slightly bilobed, rounded, apex in joint 2; wood-brown, mottled with black and reticulate, with curved vertical bands; width 2.3 mm. Body flattened, thorax depressed, subventral region prominent, joint 12 with distinct folds at tubercle ii. and 13 at tubercle i., rigid, resembling a broken piece of wood. Ground colour yellowish wood-brown, black dotted reticulate, papillose granular. Dorsal pale line edged by small black segmental lines, being the remains of the obsolete dorsal lattice marking. Joint 12 posteriorly shaded with black, behind the folded hump of tubercle ii. Subdorsal line pale, narrow, narrowly edged with black above, below with trigonate black lateral patches and traces of a lateral line; substigmatal band broad, whitish, waved, dotted with blackish. Subventer and venter gray-black, pulverulently shaded. Thoracic feet black-ringed, abdominal ones gray dotted. Tubercles small, black, iv. above the centre of the spiracle. Setæ short, stout, broadly swollen at tip, compressed, dentate, somewhat like scales, pale brown. Spiracles black.

LEPIDOPTERA IN BRITISH COLUMBIA.

Successful collections of Lepidoptera were made in British Columbia this season at Kaslo by myself, with the assistance of Mr. Caudell and Mr. Currie, and under the advice of Mr. J. W. Cockle. Over 20,300 specimens rewarded our efforts. Of these a large part are Noctuidæ, collected at sugar, showing some very fine series. Nearly 200 larvæ were observed. The material will be worked up at the U. S. National Museum. The National collection has been further enriched by the donation of 548 specimens from Messrs. Taylor, Bryant, Hanham, Bush and Harvey, whom I had the pleasure of meeting at the close of the collecting season.

HARRISON G. DYAR, Washington, D. C.

THE GENUS PLATYLABUS, WESMAEL, WITH DESCRIPTIONS OF TWO NEW SPECIES.

BY J. CHESTER BRADLEY, PHILADELPHIA, PA.

The table which I here present of the genus *Platylabus* must be considered merely as a preliminary or working table of the species in the collection of the American Entomological Society, or in my own cabinet. The other species, known to me only by description, I have included for the sake of convenience, and have placed a star before their names. I cannot vouch for the correctness of these.

P. thoracicus, Cresson, including *Phygadeuon impressus* of Provancher, which Cresson placed as a synonym of the former, var. *erythropygus*, Prov., of *thoracicus*, and *P. quadricarinatus*, Provancher, I have omitted, as the metathoracic spiracles are nearly or quite circular, placing them in the tribe *Phægenini*, and probably in either the genus *Apœleticus*, Wesmael, or *Herpestomus*, Wesmael. As I have not seen specimens of *Apœleticus*, I cannot be sure that they belong to it, but from the descriptions it would seem probable, and it is there that I would provisionally transfer them.

Mr. G. C. Davis, in Proc. Acad. Nat. Sci., Phila., 1894, p. 185, from examination of Provancher's types, finds the following synonymy:

crassicornis = Phygadeuon.
mitralis = Phygadeuon.
aciculatus = Phygadeuon.
cincticornis = Cryptus.

The genus is placed by Mr. Ashmead in the Ichneumonini, and has the basal third of the petiole flattened, wider than thick dorso-ventrally, and the scutellum margined to beyond the middle.

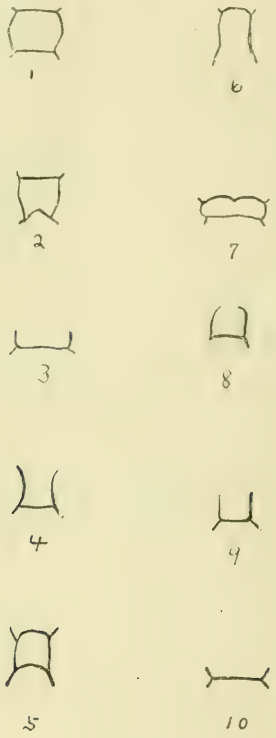


Fig. 13.

Explanation of Fig. 13.

1. Areola on metathorax of *P. clarus.*
2. " " " " *P. metallicus.*
3. " " " " *P. consors.*
4. " " " " *P. Canadensis.*
5. " " " " *P. montanus.*
6. " " " " *P. Luzernensis.*
7. " " " " *P. signatus.*
8. " " " " *P. ornatus.*
9. " " " " *P. lineolatus.*
10. " " " " *P. Californicus.*

1. Black, or rufous, or both ..... 3.
   Metallic blue; species large: antennæ of female flattened before the apex; joints of flattened portion, broader than long; metathoracic spines very prominent.
2. Areolet on metathorax subhexagonal (fig. 13,1); apical line not angled; scutellum of ♀ white; antennæ of ♂ without white annulus ..... CLARUS, Cresson.
   Areolet on metathorax shaped as in fig. 2; scutellum of ♀ black; antennæ of ♂ with white annulus ..... METALLICUS, n. sp.
3. Thorax black ..... 4.
   Thorax more or less rufous ..... 17.
4. Abdomen more or less rufous.
   Abdomen entirely black, antennæ with pale annulus; spot on scutellum white ..... 5.
5. Metathorax with areola polished, shining in centre; legs red, apex femora, tibiæ and tarsi black. Length 5 mm. Prov. Quebec, Canada ..... *RUBRICAPENSIS, Provancher.
   Metathorax with median and two lateral apical areas transversely reticulate; superior area glabrous; tergum of petiole polished; postpetiole shagreened; legs clear, ferruginous, with apex of hind tibiæ and tarsi black. Length 9 mm. Idaho .... *INCABUS, Davis.
6. Second segment only of abdomen red ..... 7.
   More than second segment of abdomen red ..... 8.
7. Wings hyaline; anterior orbits enlarged below; *antennæ with white annulus*, third joint very short and red; metathorax finely punctured, pubescent, carinæ not prominent; legs black, the four anterior red in front; posterior femora red at base, and a more or less distinct red ring at base of posterior tibiæ; petiole polished, long; abdomen with white spot at its extremity; second and base of third segment stained red. Length 7 mm ..... *SCUTELLATUS, Provancher.
8. Antennæ with pale annulus ..... 12.
   Antennæ without pale annulus; scutellum black ..... 9.
9. Petiole aciculated ..... 10.
   Petiole polished; abdomen entirely rufous (in one specimen darker); face white, with median black band; metathoracic spines and carinæ but slightly marked; discocubital nervure with a more or less distinct stump of a vein. ♂ ..... CONSORS, Cresson.

10. Antennæ black, slightly thickened beyond the middle; abdomen polished; 2 dorsal carinæ of petiole not reaching apex; carinæ on metathorax indistinct, angles subspinose; legs rufous; coxæ and trochanters black; abdomen red. Length 9 mm. ..... *PACIFICUS, Harrington.

Antennæ red, in ♂ black at apex, *much thickened at apex*; metathorax with distinct carinæ; face finely punctate; petiole large at apex. Length 5 mm ..... *RUFICORNIS, Provancher.

12. Petiole broad at apex; scutellum entirely white; generally no white between eyes and mandibles, but a white line between antennæ and eyes, between pro- and mesothorax, and between pleura and dorsum of mesothorax ..... 14.

Petiole slender, narrow at apex, not very rough, black; apex red; following 3 joints abdomen red; no white on thorax or face, except between the eyes and the mandibles and the apex of scutellum; flagellum rufous at base. Length of antennæ 9 mm., of insect 8 mm ..... CANADENSIS, Cresson.

14. Dorsum of 3 basal abdominal segments piceous, rest of abdomen rufous; face, mouth-parts, broad orbital lines, cheeks, neck, stripes on mesonotum, most of pleura and sternum, large spot on metapleura, apical spot on metathorax (but black in centre), petiole, broad margin of remaining segments and parts of legs white; carinæ on metathorax prominent, spines long; petiole scabrous, with two distinct carinæ. Length 8 mm ..... FOXI, Davis.

Abdomen red, apical portion more or less dark; only an anterior orbital line, ring on antennæ, scutellum and humeral lines white. 15.

15. Abdomen long and narrowly oval; face uniformly and closely punctured, not polished; anterior orbital line reduced to a mere short stripe; antennæ long, 6 mm.; basal joints of flagellum more than twice as long as broad; metathoracic carinæ well marked; spines not prominent; apex of petiole aciculated; base of second segment shagreened; abdomen red; base of petiole darkened. Length 7–8 mm ..... MONTANUS, Cresson.

Abdomen short and very broadly oval; face sparingly punctured, smooth and polished anteriorly and on clypeus; white line in front of eyes long and broad; antennæ short, 4 mm.; basal joint of

flagellum not twice as long as broad; metathoracic carinæ and spines prominent; petiole smooth, polished; second segment of abdomen evenly punctured; abdomen red; apex of 4th and base of 5th segments black, rest of apex white. Length 6.5 mm..... LUZERNENIS, n. sp.

17. Thorax entirely rufous..... 22.
Thorax more or less black..... 18.

18. Scutellum white; pleura, propodeum and legs rufous; white annulus on antennæ..... 19.
Scutellum black or rufous..... 21.

19. Antennæ as long as body, or longer..... 20.
Antennæ considerably shorter than body; anterior orbital line white, interrupted medially; metathoracic carinæ and spines inconspicuous; petiole broad apically, roughened, very finely subaciculate; abdomen moderately broadly oval, rufous; fifth segment fuscous, apex white..... SIGNATUS, Provancher.

20. Antennæ longer than the body; anterior orbital broad, not interrupted, also a fine posterior orbital line present; a bright white stripe on anterior margin of prothorax; propodeum, legs, pleura, stains on mesonotum and abdomen, except base of petiole, rufous; metathoracic carinæ and spines sowewhat more strongly marked than in *signatus*; petiole not so broad apically, and abdomen more narrow and longer than in that species; petiole sub-polished at apex, laterally carinate..... ORNATUS, Provancher.
Antennæ as long as body; prothorax, mesonotum and abdomen beyond second segment black, remainder of insect rufous; broad orbital lines, face except transverse spot above clypeus, clypeus except central apical spot, scape beneath, collar, humeral line, line beneath each wing, stripes on mesonotum and mesopleura, two spots on metathorax above hind coxæ, broad apical margin on all abdominal segments, more or less of anterior coxæ and trochanters, white, apex of femora, apical third of tibiæ posteriorly and tarsi of hind legs black; metathorax rugose; superior area subpolished; petiole very broad, finely and rather sparsely punctured..... *BAKERI, Davis.

21. Antennæ without white annulus. One specimen of *consors* that I have seen has the propodeum slightly rufous..... CONSORS, Cresson (pars.)

22. Antennæ with white annulus, rufous at base, black at apex; abdomen and petiole rufous, smooth polished, without carinæ.....LINEOLATUS, Provancher.

Antennæ without white annulus.....23.

23. More or less shiny; rufous, stains of black on mesothorax; third abdominal segment rufous; legs all red; areolet in wings moderate in size; base of metathorax punctured, carinate; postpetiole not very broad, polished, but sparingly punctured.....CALIFORNICUS, Cresson.

Opaque; pale ferruginous; base of third abdominal segment and apex of posterior tibiæ black; areolet in wings very large; base of metathorax rugose and without carinæ; postpetiole very broad and shagreened.....*OPACITUS, Davis.

1. P. CLARUS, Cresson. ♀. ♂.

1867. *Ichneumon clarus*, Cresson, ♀. Tr. Amer. Ent. Soc., Vol. I., p. 297.

1877. *Platylabus clarus*, Cresson, ♀. ♂. Tr. Am. Ent. Soc., VI., p. 199.

1886. *Platylabus magnificus*, Provancher, ♀. Add. Faun. Hym. Can., p. 36.

This, and the following species, are easily distinguished by their large size and brilliant blue colour. Areola, shown in figure 1, from the description *magnificus*, Prov., must belong here.

Habitat.—Mass.; Bécancour, Can. (*magnificus*).

Type in coll. American Ent. Society.

2. P. METALLICUS, n. sp. ♀. ♂.

Bright metallic blue; wings hyaline; white annulus on antennæ; metathoracic area shown in fig. 2. Length of antennæ 12 mm.; of insect 12 mm.

♀. Metallic blue: anterior orbital line interrupted medially, short posterior line, annulus on antennæ, front tibiæ and apex of femora anteriorly, trace on middle femora and tibiæ anteriorly, white; remainder of front & tibiæ and tarsi and posterior tarsi ferruginous; clypeus broadly truncate, labrum prominent, face narrowed in front of eyes; base of clypeus marked by suture, two longitudinal,

well-impressed, grooves on face, which is evenly and closely punctured ; antennæ as long as the body, thickened and flattened beyond the apex, the joints of flattened portion broader than long ; thorax evenly punctured, more densely on the pleura ; scutellum slightly reddish at apex ; metathorax above and at apex transversely wrinkled, areola smooth, polished, carinæ well marked, tooth at hind angles large and distinct ; wings hyaline ; abdomen shagreened, especially at base of second segment ; petiole with two very well marked and angular carinæ, not reaching apex ; postpetiole finely shagreened ; gastrocœli large.

♂. Metallic blue ; face, anterior and posterior orbital lines, mandibles, annulus on antennæ, scape beneath, short line beneath the wings, scutellum, anterior legs in front, coxæ, trochanters, tibiæ, tarsi and apex of femora in front white, rest of tibiæ and tarsi of front 4 legs and tarsi of posterior legs ferruginous. In other respects like the female.

The type ♀ of this species was included by Cresson in his redescription of *clarus* in Tr. Am. Ent. Soc., VI., 1877, p. 199, and was the exception which he made as to the white scutellum of that species. The male specimen was added to the collection afterwards, and differs from the male of *clarus* in having the white annulus on the antennæ, as well as in the metathoracic character.

Habitat.—N. H. (♀ type). Me. (♂ type).

Types.—In the collection of the American Entomological Society.

3. P. RUBRICAPENSIS, Provancher, ♀.

1882. *Platylabus rubricapensis*, Provancher, ♀. Nat. Can., XIII., p. 329.

Habitat.—Cap Rouge, Canada.

4. P. INCABUS, Davis, ♀.

1897. *Platylabus incabus*, Davis, ♀. Tr. Am. Ent. Soc., XXIV., p. 352.

Habitat.—Moscow, Idaho (Aldrich).

5. P. SCUTELLATUS, Provancher, ♀, ♂.

1875. Ischnus scutellatus, Provancher. Nat. Can., VII., p. 111.

1877. Platylabus scutellatus, Cresson. Tr. Am. Ent. Soc., VI., p. 200, ♂.

Habitat.—Cap Rouge, Canada.

6. P. CONSORS, Cresson, ♂.

1877. *Platylabus consors*, Cresson, ♂. Tr. Am. Ent. Soc., VI., p. 200. Cresson says this may be the male of *Californicus*. See figure 3.

Habitat.—California.

Types.—In the collection of the American Entomological Society.

7. P. PACIFICUS, Harrington, ♀.

1894. *Platylabus pacificus*, Harrington, ♀. Can. Ent., XXVI., p. 210.

Habitat.—Vancouver's Island (Taylor).

8. P. RUFICORNIS, Provancher, ♀, ♂.

1886. *Platylabus ruficornis*, Provancher, ♀, ♂. Add. Faun. Hym. Can., p. 38.

Habitat.—Ottawa, Canada (Harrington).

9. P. CANADENSIS, Cresson, ♀.

1877. *Platylabus canadensis*, Cresson, ♀. Tr. Am. Ent. Soc., VI., p. 200. Figure 4.

Habitat.—Canada.

Type.—In the collection of the American Entomological Society.

10. P. FOXI, Davis, ♂.

1897. *Platylabus Foxi*, Davis, ♂. Tr. Am. Ent. Soc., XXIV., p. 353. This species has much more white on it than any other. Most of the males of the genus have more white than the females, and when the female of this species is known it will doubtless be less plentifully supplied with white.

Habitat.—Camden, N. J. (Fox).

11. P. MONTANUS, Cresson, ♀.

1877. *Platylabus montanus*, Cresson, ♀. Tr. Am. Ent. Soc., VI., p. 200. Figure 5.

Habitat.—N. H.

Types.—In the collection of the American Entomological Society.

12. P. LUZERNENSIS, n. sp., ♀.

Black; abdomen and legs mostly rufous. Length, 6.5 mm. See figure 6.

♀. Anterior orbital lines not broad nor continued below the eyes, a short line behind the eyes near their top; annulus on antennæ,

humeral line, line below the wings and scutellum white; legs rufous, except coxæ and trochanters and knees, tarsi and apex of tibiæ of hind legs, which are fuscous. Remainder of insect as described in the table. A quite distinct species.

Habitat.—White Haven, Luzerne Co., Pa., Aug. 15, 1902. (Taken by the author.)

Type.—One female, in the author's collection.

13. P. SIGNATUS, Provancher, ♀.

1874. *Phygadeuon signatus*, Provancher. Nat. Can., VI., p. 282.

1877. *Platylabus signatus*, Cresson. Tr. Am. Ent. Soc, VI., p. 200. Figure 7.

Habitat.—P. Que., Canada.

14. P. ORNATUS, Provancher, ♀.

1875. *Phygadeuon ornatus*, Provancher, ♀. Nat. Can., VII., p. 181.

1877. *Platylabus ornatus*, Cresson. Tr. Am. Ent. Soc., VI., p. 200. Figure 8.

Habitat.—P. Que., Canada.

15. P. BAKERI, Davis, ♂.

1897. *Platylabus Bakeri*, Davis, ♂. Tr. Am. Ent. Soc., XXIV., p. 352.

Habitat.—Ann Arbor, Mich. (Baker).

16. P. LINEOLATUS, Provancher, ♀.

1875. *Ichneumon lineolatus*, Provancher. Nat. Can., VII., p. 82.

1875. *Phygadeuon rufipes*, Provancher. Nat. Can., VII., p. 181.

1877. *Platylabus lineolatus*, Cresson. Tr. Am. Ent. Soc., VI., p. 201. Figure 9.

Habitat.—P. Que., Canada.

17. P. CALIFORNICUS, Cresson, ♀.

1877. *Platylabus californicus*, ♀. Tr. Am. Ent. Soc., VI., p. 201. Close to the preceding species. Figure 10.

Habitat.—California.

Types.—In the collection of the American Entomological Society.

18. P. OPACITUS, Davis, ♂.

1897. *Platylabus opacitus*, Davis. Tr. Am. Ent. Soc., XXIV., p. 353.

Habitat.—Moscow, Idaho (Aldrich).

SYNOPSIS OF EPEOLINÆ.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Females.

Segment 5 with a more or less evident bevelled or truncate space, false pygidium, which is rather sparsely short, bristly and fuscous, purplish or sericeous in certain lights; ovipositor (applied here to one of a pair of appendages often exserted one on each side of the sting) setiform, fimbriate, apex with several curved divergent spines; mandibles simple; maxillary palpi 3-jointed; scutel finely punctured, sub-bilobed; segments 1–4 with apical fasciæ of pale appressed pubescence ..... Triepeolus.

Segment 5 with a silvery lunule at apex; ovipositor ligulate, bare or pubescent, apex acute, its edges dentate; at least the mandibles, tegulæ and legs red ..... 1.

1. Maxillary palpi 3-jointed; mandibles with an internal tooth; closely punctured; scutel sub-bilobed; pleura and pectus with surface nearly concealed by pubescence; mesonotum bilineate; border of segment 1 interrupted on apical margin, 2 with fascia produced laterally and interrupted medially, 3–4 with apical fasciæ notched in the middle, 5 with two lateral patches; tubercles, labrum and joints 1–3 partly red; 8 mm.; *minima* in *gn. nov.*, *type Triepeolus minimus*, Rob. ..... Argyroselenis.

Maxillary palpi 2-jointed ..... Epeolus.

Males.

Maxillary palpi 2-jointed ..... Epeolus.

Maxillary palpi 3-jointed ..... 1.

1. Mandibles with an internal tooth; *minima* in ..... Argyroselenis.

Mandibles simple ..... Triepeolus.

Triepeolus, Robertson.

Females.

Ventral segment 5 flattened, concave, strongly produced and bent down at apex; dorsal segment 5 with a semicircular sericeous truncation; black; mesonotum anteriorly with a broad pale-yellow band; border of segment 1 broad, interrupted basally and sometimes apically; fasciæ continuous on 2–4, gradually or abruptly widening on sides of 2; 13–16 mm. ..... concavus.

Ventral segment 5 simple; dorsal segment 5 usually with lateral patches ..... 1.

1. Border of segment 1 hardly wider on the sides; fascia on sides of 2 abruptly produced forward; mesonotum bilineate; apex of pygidium convex.....6.
   Border of segment 1 much wider on the sides.....2.
2. Mesonotum bilineate; pygidium longitudinally carinate.....4.
   Mesonotum with a subcordate completely enclosed space; black...3.
3. Fasciæ continuous except on base of segment 1, abruptly widened on sides of 2; space on mesonotum hardly trilobed; patch on pleura subquadrate; scutel flat, spines nearly obsolete; 14–16 mm.....Nevadensis.
   Fasciæ interrupted on segments 1–2, gradually widening on sides of 2; space on mesonotum trilobed; patch on pleura L-shaped; scutel sub-bilobed, spines distinct; 10–14 mm.....remigatus.
4. Segment 5 shining, rather coarsely punctured, apex concave, bevelled space and lateral pubescent patches indistinct; apex of pygidium truncate; scutel rather strongly bilobed; black, labrum, middle of mandibles, tegulæ, tibiæ and tarsi tinged with red; segment 1 with transverse subquadrate patch, the apical fascia interrupted or continuous; fasciæ on 2–4 continuous, paler on 4; lunate patch on pleura separated from patch surrounding tubercle; ventral fasciæ none; 13 mm.; *sp. nov*.....simplex.
   Segment 5 opaque, densely punctured, apex convex, bevelled space always and lateral pubescent patches usually distinct; apex of pygidium convex; scutel less bilobed; patch on segment 1 usually triangular; fasciæ on 1–2 interrupted, 3–4 continuous, that on 4 of the same colour; lunate patch on pleura usually connected with patch surrounding tubercles; ventral segments 2–4 with apical fasciæ.....5.
5. Labrum, mandibles, joints 1–3, tegulæ and legs red; 11–12 mm.....lunatus.
   Labrum, mandibles, joints 1–3, tegulæ and legs black; 10–13 mm.....concolor.
6. Ornaments cinereous; fascia on segment 1, and sometimes on 2, interrupted; black; closely punctured; 11–12 mm....donatus.
   Ornaments cream colour; legs usually red.....7.
7. Pectus coarsely and sparsely punctured; mandibles, labrum, joints 1–3 and tegulæ sometimes tinged with red; fascia on segment 1, and sometimes on 2, interrupted; 8–11 mm.....pectoralis.
   Pectus finely and closely punctured.....8.

8. False pygidium small; apex of ventral segment 5 narrow; black; coxæ and front trochanters black; closely punctured; fasciæ interrupted on segments 1–2; 12 mm.; *sp. nov*.....micropygius.
False pygidium large.....9.
9. Pleura with an L-shaped patch; middle and hind femora red; fasciæ on segments 3–4, and usually on 2, continuous; 10 mm.helianthi.
Pleura with a lunate patch; femora usually more or less black; labrum, mandibles; scape, tubercles and tegulæ usually red; the legs rarely black; fasciæ usually interrupted on segments 1–3, usually continuous on 4; 8–12 mm.....Cressonii.

Males.

Border of segment 1 hardly broader on the sides; mesonotum bilineate; abdomen 6-fasciate.....6.
Border of segment 1 broad laterally, forming lunate or subquadrate patches; ornaments cream colour.....1.
1. Disc of mesonotum not enclosed by a complete border.....3.
Disc of mesonotum black, subcordate, with a complete border; black.2.
2. Abdomen 5-fasciate, rarely a faint fascia on segment 6; the bands continuous, that on 2 suddenly widened on the sides; scutel flat, spines nearly obsolete; 13–16 mm.....Nevadensis.
Abdomen 6-fasciate, bands interrupted on segments 1–2, gradually widening on sides of 2, cinereous on 6; 10–15 mm....remigatus
3. Mesonotum anteriorly with a broad band; abdomen 5-fasciate, segment 1 with fascia continuous or interrupted, 2–5 with continuous fasciæ wider on sides of 2–3; black; 12–15 mm...concavus.
Mesonotum bilineate.....4.
4. Abdomen 5-fasciate, bands continuous or interrupted on segment 1, continuous on 2–5, cinereous on 4–5; black patch on segment 1 transverse subquadrate; black, labrum, mandibles, base of antennæ, tegulæ, tibiæ, tarsi and pygidium more or less tinged with red; 12 mm.....simplex.
Abdomen 6-fasciate, bands interrupted on segments 1–2, sometimes on 3, cinereous or whitish on 5–6; black patch on segment 1 usually triangular; 10–13 mm.....5.
5. Labrum, mandibles, joints 1–3, tegulæ and legs red.....lunatus.
Labrum, mandibles, joints 1–3, tegulæ and legs black.....concolor.
6. Ornaments cinereous; fasciæ usually interrupted on segments 1–2, white on 6; black; 9–12 mm.....donatus.
Ornaments cream colour; tibiæ and tarsi usually red.....7.

7. Middle and hind femora red ; mandibles, labrum, antennæ and tegulæ black ; pleura with an L-shaped mark ; 10–11 mm....helianthi.
Middle and hind femora more or less black ; mandibles, labrum, base of antennæ and tegulæ red ; rarely entirely black ; pleura commonly covered with pubescence ; fasciæ usually interrupted ; 8–11 mm.....Cressonii.

Epeolus, Latreille.

Females.

Front with a large tubercle on each side ; mesonotum not bilineate ; middle of segment 1 and apex of 2 with golden fasciæ ; mandibles with an internal tooth ; head and thorax coarsely, abdomen finely punctured ; pectus with coarse, sparse punctures ; labrum, joints 1–3, collar, tubercles, line above, tegulæ, scutel and axillæ red ; spurs black ; wings fuliginous ; stigma rather large ; 7–9 mm.....bifasciatus.
Front simple ; mesonotum bilineate ; border of segment 1, apical margins of 2–4, and lateral patches on 5 of pale pubescence....1.

1. Pleura below finely and closely punctured ; scutel low ; transverse, opaque ; mandibles simple or with an indistinct internal tooth ; fasciæ continuous or nearly so .....3.
Pleura below coarsely and sparsely punctured ; scutel bilobed, shining; fasciæ interrupted, that on sides of 2 projecting forward ; abdomen finely punctured ; tubercles, axillary spines and spurs more or less red .....2.

2. Thorax coarsely, rather sparsely, punctured ; mandibles simple ; fasciæ cinereous, pointed on the disc ; silvery lunule subtriangular ; joints 1–3 more or less red ; 9 mm.....lectoides.
Thorax rather finely and closely punctured ; mandibles with an internal tooth ; fasciæ club-shaped on the disc ; silvery lunule transverse ; joints 1–3 red ; scutel usually more or less red ; 7–9 mm.....interruptus.

3. Scutel quite surpassing lateral spines ; spurs red ; lateral patches of segment 5 separate ; femora more or less black ; 9–11 mm .....autumnalis.
Scutel hardly surpassing lateral spines ; spurs black ; lateral patches of segment 5 connected across the disc ; femora red ; 7–8 mm.....pusillus.

Males.

Front with a large tubercle on each side ; mesonotum bare ; 7–9 mm.....bifasciatus.
Front simple ; mesonotum bilineate ; segments 1–6 with apical fasciæ .....1.

1. Pleura below finely and densely punctured ; scutel flat.....3.
   Pleura below coarsely and sparsely punctured ; scutel bilobed.....2.
2. Mandibles simple ; thorax coarsely punctured.....lectoides.
   Mandibles with an internal tooth ; 7–9 mm.....interruptus.
3. Scutel quite surpassing lateral spines ; spurs red ; 7–9 mm. autumnalis.
   Scutel hardly surpassing lateral spines ; spurs black ; 6–8 mm. pusillus.

LIST OF CANADIAN COLEOPTERA.

BY JOHN D. EVANS, TRENTON, ONT.

(Continued from page 243.)

Gyrinidæ.

1505, Gyrinus minutus, Fab., '80.
*1514, " aquiris, Lec., '80.
" sp., '80.

Hydrophilidæ.

1542, Helophorus oblongus, Lec., '79, '80.
1543, " lacustris, Lec., '80.
1546, " linearis, Lec., '80.
1597, Hydrocharis obtusatus, Say, '80.
1614, Berosus striatus, Say, '80, '81.
*1622, Laccobius ellipticus, Lec., '80.
1653, Hydrobius fuscipes, Linn., '79, '81.
Cercyon, sp., '81.

Silphidæ.

1698, Necrophorus marginatus, Fab., '79, '80.
1702, " vespilloides, Hbst., '81.
1706, Silpha lapponica, Hbst., '79, '80.
1707, " trituberculata, Kirby, '81.
1709, " noveboracensis, Forst., '81.
1710, " Americana, Linn., '81.
*1711, " ramosa, Say, '79, '80, '81.

Staphylinidæ.

2055, Aleochara bimaculata, Grav., '79.
2100, Quedius fulgidus, Fab., '79.
2119, Creophilus villosus, Grav., '79, '80, '81.
2124, Staphylinus badipes, Lec., '81.
2149, Philonthus æneus, Rossi., '79, '81.
2150, " furvus, Nord., '79.
2167, " hepaticus, Er., '79, '80.
*2233, " Lecontei, Horn., '79.
*2303, Stenus bipunctatus, Er., '81.
2573, Pæderus littorarius, Grav., '81.
2732, Bledius ruficornis, Lec., '81.
Homalium, sp., '81.

Scaphidiidæ.

2976, Scaphium castanipes, Kirby, '81.

Phalacridæ.

*2993, Phalacrus politus, Melsh., '79.
*2996, Olibrus vittatus, Lec., '79, '80.
2998, " striatulus, Lec., '79, '80.
" 2 sp., '79 and '80.

Coccinellidæ.

*3035, Næmia episcopalis, Kirby,' 79.
3041, Hippodamia 5-signata, Kirby, '81.
3043, " Lecontei, Muls, '79.
3046, " convergens, Guer., '80.
3050, " 13-punctata, Linn., '79, '80.
3051, " parenthesis, Say, '79, 80.
3058, Coccinella 9-notata, Hbst., '79.
3059, " transversoguttata, Fab., '79,'80.
3060, " monticola, Muls., '79.
3072, Harmonia 12-maculata, Gebl., '81.
3075, Anatis 15-punctata, Oliv., '80, '81.
*3095d, Brachyacantha albifrons, Say, '79, '80.

Erotylidæ.

3236, Tritoma thoracica, Say, '79.

Cucujidæ.

3314, Pediacus fuscus, Er., '81.

Dermestidæ.

*3418, Dermestes marmoratus, Say, '79, '80.
3425, " lardarius, Linn., '79.
3428, " vulpinus, Fab., '80.

Histeridæ.

3480, Hister interruptus, Beauv., '79.
3494, " depurator, Say, '79, '80.
*3583, Saprinus lugens, Er., '79, '80.
3586, " Oregonensis, Lec., '79, 80.
3586a, " distinguendus, Mars., '79.
*3610, " fimbriatus, Lec., '79.

Nitidulidæ.

Nitidula, sp., '79.
3664, Cercus abdominalis, Er., '79.
*3734, Pocadius helvolus, Er., '80.
*3739, Meligethes mutatus, Hor., '79.

Byrrhidæ.

3887, Cytilus sericus, Forst., '80.
Byrrhus, sp., '79.

Heteroceridæ.

Heterocerus, 2 sp., '81.

Dascyllidæ.

4016, Cyphon variabilis, Thunb., '81.
" 2 sp., '81.

Elateridæ.

*10049, Cryptohypnus nocturnus, Esch., '79, '80.
4245, Elater apicatus, Say, '80.
4253, Drasterius elegans, Fab., '79, '80.
4287, Agriotes limosus, Lec., '79, '80.
4297, Dolopius lateralis, Esch., '79, '80, '81.
4322, Melanotus fissilis, Say, '80.
*4467, Corymbites morulus, Lec., '79, '80.
4482, " hieroglyphicus, Say, '81.
4484, " cruciatus, Linn., '79.
4495, " metallicus, Payk., '81.
" sp., '79.

Buprestidæ.

4576, Dicerca prolongata, Lec., '79, '81.
4619, Melanophila longipes, Say, '79, '80.
4739, Agrilus anxius, Gory., '79.
4761, Brachys ærosa, Melsh., '80.

Lampyridæ.

4815, Ellychnia corrusca, Linn., '79, '80.
4818, Pyropyga nigricans, Say, '79, '80.
4824, Pyractomena borealis, Rand., '79, '81.
4935, Telephorus nigritulus, Lec., '81,
4939, " flavipes, Lec., '80.
4948. " Curtisii, Kirby, '81.
*4952, " Oregonus, Lec., '79, '80.
" sp., '79.
" 3 sp., '81.

Malachidæ.

*4999, Collops cribrosus, Lec., '79, '80.
5013, " vittatus, Say, '79.

Cleridæ.

5159, Trichodes Nuttalli, Kirby, '79.
5232, Necrobia violaceus, Linn., '79, '80.

Lucanidæ.

5419, Platycerus depressus, Lec., '79, '80.

Scarabæidæ.

5435, Canthon lævis, Drury, '80.
5444, Copris anaglypticus, Say, '81.
5459, Onthophagus janus, Panz, '79.
5510, Aphodius hamatus, Say, '80, '81.
*5513, " occidentalis, Horn., '79, '80.
5528, " granarius, Linn., '80.
*5550, " consentaneus, Lec., '79, '80.
*5620, Trox sonoræ, Lec., '79, '80.
5623, " unistriatus, Beauv., '80.
5650, Hoplia trifasciata, Say, '81.

5656, Dichelonycha elongata, Fab., '79.
5659, " testacea, Kirby, '80.
5662, " Backii, Kirby, '79.
5674, Serica vespertina, Gyll., '79.
" sp., '79.
10240, Lachnosterna dubia, Smith, '79.
*5822, Polyphylla decemlineata, Say, '79.
*5925, Cremastochilus Knockii, Lec., '79.
5939, Trichius affinis, Gory., '79.

Cerambycidæ.

5975, Criocephalus agrestis, Kirby, '79.
6062, Elaphidion villosum, Fab., '80.
6183, Xylotrechus undulatus, Say, '79.
6248, Pachyta liturata, Kirby, '79.
6259, Acmæops bivittata, Say, '79, '80.
6273, " proteus, Kirby, 79.
6279, Bellamira scalaris, Say, '81.
*6295, Typocerus balteatus, Horn., '79.
*6323a, Leptura convexa, Lec., '79, '80.
6361, " mutabilis, Newm., '79.
*6369, Monilema annulatum, Say, '79, '80.
6386, Monohammus maculosus, Hald., '80.
6387, " scutellatus, Say, '81.

(To be continued.)

A RARE BUTTERFLY.

On July 1st I caught a *Hypolimnas misippus*, Linn., ♂, at the sugar estate "Isabel," ten miles north-east of this town. Gundlach, in his "Entomologia Cubana," 1881, states that he has only caught one male in 1851 at Cardenas, and two females in 1869 and 1876, respectively. I do not know of any other male having been caught in the island, and should be very glad to hear from any of your correspondents who may have caught them since 1881.

My specimen is quite perfect and measures 57 mm. across the wings, and is therefore slightly smaller than the specimen illustrated in Holland's "Butterfly Book." THEO. BROOKS, Guantanamo, Cuba.

BOOK NOTICES.

THE ORTHOPTERA OF INDIANA.—By W. S. Blatchley, State Geologist, Indianapolis, Ind. From the 27th Annual Report of the Department of Geology and Natural Resources of Indiana, 1902. One Vol., 8vo., pp. 123 to 471.

No one better qualified than the author of this work could possibly be found to prepare a handbook of the Orthoptera of Indiana, and admirably he has performed his self-imposed task. For nearly twenty years he has been a close observer and student of the insects of this order and has published many papers of both a systematic and descriptive character upon them. Several of these have appeared from time to time in the pages of this magazine. The book contains the results of his investigations and studies, and is designed to impart a full and clear knowledge of this important group of insects to school pupils and young people on the farm. Certainly anyone desiring to study the order, whether living in Indiana or Ontario, or any of the neighbouring States, will find his way made easy by this work, and will learn without much difficulty how to distinguish the species and what their life-histories and characteristics are.

The opening pages of the book give a full and clear account of the external anatomy of a Locust, the natural enemies of the Orthoptera, and a bibliography of the more important books and papers on the order. The main portion of the volume is termed "A Descriptive Catalogue of the Orthoptera Known to Occur in Indiana." Convenient keys are given to the families, genera and species, facilitating the identification of a specimen, and these are followed in each case by scientific descriptions, the synonymy, geographical distribution and other information; in the case of the Locusts especially the accounts of the habits of the species are very full and interesting. The work is rendered complete by a chapter on the Life-zones of the State as illustrated by the distribution of the Orthoptera, a glossary of the terms used and a full index. There are over 120 excellent figures in the text, largely taken from Lugger's Orthoptera of Minnesota, and a beautiful coloured plate of the remarkable pink variety of the Oblong-winged Katydid *(Amblycorypha oblongifolia)*.

A Classification of North American Spiders.—By Prof. John Henry Comstock, Ithaca, N. Y. Comstock Publishing Co., 1903. Large 8vo., pp. 56. (Price, 50 cents.)

Anyone taking up the study of Spiders will find this a useful manual, as the tables will give him a clue, without much difficulty, to the families and genera; for the determination of species he will require to have recourse to some other work, such as Emerton's "Common Spiders of the United States." The tables require for their use some previous knowledge of the external anatomy of the Spiders and the technical terms used in their description. The author has in preparation a textbook of North American Arachnida, and publishes these tables in advance in order that they may be tested before publication of the larger work.

The Insect World: A monthly magazine, edited by Y. Nawa, Gifu, Japan. Vol. VII., 1903.

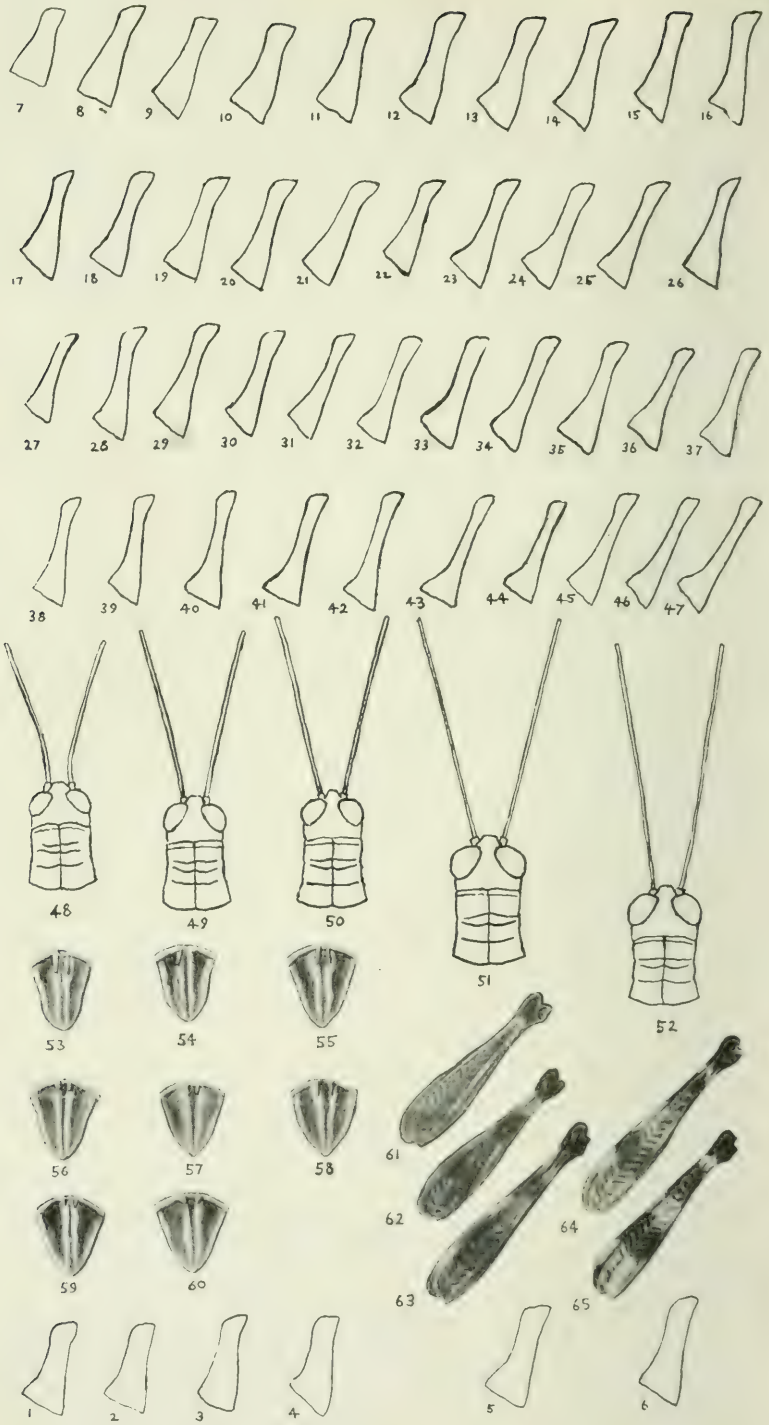
Recent numbers of this remarkable magazine have contained a page or two in English, giving an illustrated description of some Sphinx Moth or other interesting insect. Hitherto one has only been able to read the English title, admire the excellent illustrations and turn over the pages with a great longing to be able to read Japanese. In the January number there was an account of a remarkable moth, whose larva lives as a parasite on certain species of Cicada; a coloured plate is given showing the different stages of the insect, the neuration of the wings of the moth and the host with parasites attached. Mr. Marlatt gave, at the meeting of Economic Entomologists, very interesting descriptions of Mr. Nawa and his entomological laboratory and museum, which he visited last year.

DEATH OF PROFESSOR GROTE.

It is with profound regret that we record the death of our greatly-esteemed friend, Professor Augustus Radcliffe Grote, A. M., the tidings of which has just reached us. The sad event occurred on Saturday, September 12th, at Hildesheim, Germany, where he had been living for the past nine years; during the previous ten or eleven his home had been at Bremen. With the exception of this last score of years, his life was spent in the United States, and was devoted almost entirely to the study of the Lepidoptera of North America.

We beg to offer our deepest sympathy to his widow and children in their affliction. It may be some slight consolation to them to know that their grief is shared by many on this side of the Atlantic who were his friends and colleagues in earlier years.

Mailed October 3rd, 1903.



THE GENUS PODISMA.

The Canadian Entomologist.

Vol. XXXV. LONDON, NOVEMBER, 1903. No. 11

THE GENUS PODISMA IN EASTERN NORTH AMERICA.

BY E. M. WALKER, B.A., M.B., TORONTO.

Podisma (Latr.) is a particularly interesting genus of Melanopli, since it is the only one of that immense group that occurs in the Old World, where, indeed, it is represented by considerably more described species than it is in North America. It is also of interest from its distinctly boreal and alpine distribution, being almost peculiar to high latitudes or altitudes. It is a circumpolar genus, inhabiting the mountains and boreal parts of Europe, Asia and North America, a larger number of species having been described from Europe than elsewhere.

The North American species are found in two widely-separated regions: the Rocky Mountain region from Alberta to New Mexico in the west, and from North-western Ontario to Maine and south to Pennsylvania in the east. It is to the eastern species that the reader's attention will be directed in the present paper.

Although in some cases *Podisma* is but narrowly separable from *Melanoplus*, it is on the whole a distinct type, differing from the latter chiefly in the widely-separated mesosternal lobes, the interspace in the male being transverse and as wide or nearly as wide as the lobes themselves, and in the female strongly transverse and as wide as or wider than the lobes. The pronotum is always short and sometimes subcylindrical, with the lateral carinæ poorly defined or absent, and the hind margin truncate or slightly emarginate, or at most obtusangulate. The tegmina are normally abbreviate, and often entirely absent. Of the North American species, those from the east have no tegmina, while of the western forms these organs are present in all but one species.

Two species of *Podisma* have been described from eastern North America, *P. glacialis*, Scudd., from the mountains of New England, New York and Pennsylvania, and *P. variegata*, Scudd., from specimens taken at Ithaca and Enfield Falls, Tompkins Co., N. Y. Before the description of the latter was published the writer sent drawings to Mr. Scudder of specimens of *Podisma* taken at De Grassi Pt., Lake Simcoe, Ont., which were pronounced *P. variegata*, and later on specimens from the same locality were sent to him. On Sept. 12th, 1900, while collecting at North

Bay, Lake Nipissing, 175 miles north of De Grassi Pt., a series of specimens of *Podisma* were taken, which showed features belonging to both species, but were nearer *P. glacialis*. Some of these were sent to Mr. Scudder, who named them *glacialis*, "varying slightly towards *variegata*, especially in the (feebly) banded hind femora."

Since then I have collected a considerable series of specimens from two localities intermediate in latitude between Lake Simcoe and Lake Nipissing, viz., at Tobermory, near Cape Hurd (Bruce Co.), and at Algonquin Park. I have also examined a series of 4 ♂ ♂ and 3 ♀ ♀ taken at several different localities in Pennsylvania, belonging to the museum of the Academy of Natural Sciences of Philadelphia, and kindly loaned to me through Mr. J. A. G. Rehn. To complete my collection, I have specimens of typical *glacialis* from the following localities in New England: Mt. Washington, N. H. (3 ♂ ♂, 3 ♀ ♀); Greylock Mt., Mass. (2 ♂ ♂, 2 ♀ ♀); Speckled Mt., Stoneham, Me. (3 ♂ ♂, 3 ♀ ♀).

A careful study of all these specimens has revealed a complete series of gradations from the typical *glacialis* of the White Mountains to the typical *variegata* from Pennsylvania, though these extremes are widely different, not only in structure and markings, but in habits and character of environment.

The chief points of distinction between the two forms as given by Mr. Scudder may be tabulated as follows:

	P. glacialis.	*P. variegata.*
Eyes.	Moderately prominent.	Very prominent, especially in the ♂.
Antennæ.	Slightly shorter than hind femora.	Distinctly longer than hind femora (♂).
Hind femora.	Yellowish grass-green, obscurely bifasciate with dark olivaceous green.	Flavo-testaceous, broadly bifasciate with blackish fuscous.
Furcula.	Crosses basal fifth or less of supra-anal plate.	Hardly longer than last segment.
Cerci of ♂.	Stouter, middle breadth not less than ⅔ basal breadth.	Very long and slender; middle breadth less than ½ basal breadth.

A study of my series gives the following results:

1. Eyes.—Those of the N. E. specimens (typical *glacialis*) are the least prominent, the specimens from Mt. Washington having less prominent eyes than those from Speckled Mt. and Greylock Mt. Among the rest of

the series there is but little variation, the greatest degree of prominence being seen in the Pennsylvania specimens (typical *variegata*) and the Lake Simcoe specimens. The eyes of some of the ♂ ♂ from North Bay approach pretty closely those of the ♂ ♂ from Speckled Mt., and the ♀ ♀ from the latter locality are quite like those from North Bay in this respect. There is, however, very little range of variation among the Canadian specimens. An idea of the total amount of variation in the prominence of this organ can be obtained from the accompanying plate.

2. Antennæ.—The variation in the length of this structure can be seen by a glance at the table of measurements. The specimens from Mt. Washington have relatively the shortest antennæ, and it is plain from the measurements of the New England specimens that they average distinctly shorter than the Canadian specimens. From Algonquin Park southward to Pennsylvania, except at high altitudes, we find a gradual but steady increase in the length of the antennæ, the longest ones belonging to Pennsylvania specimens. In typical *variegata* the antennæ of the ♂ are distinctly longer than the hind femora, in *glacialis* slightly shorter. In most of the Canadian specimens they are about equal in length, being faintly shorter in the North Bay specimens, faintly longer in those from Lake Simcoe.

3. The hind femora are relatively shortest in the N. E specimens, but are practically constant in length throughout the remainder of the series. Some of the Algonquin Park series, however, are inseparable from the N. E. specimens on this score. A more important feature is the colour and distinctness of the bands of the hind femora. In specimens from Algonquin Park and North Bay, like those from N. E., they are uniform green, with the faintest traces of bands, but in the majority from this locality they are more or less distinctly though feebly banded, the lighter areas being yellowish green. A number of ♂ ♂, however, have the superior sulcus as conspicuously banded as in the Pennsylvania specimens. The hind femora of the latter are in the ♂ strongly fasciate with pale yellowish and dark brown or blackish, the contrast being much greater in the main than in the specimens from Lake Simcoe, which most resemble them. Every gradation is present in the series.

4. The furcula shows great diversity of size and form. As with the other characters, the most northern of the Ontario specimens are most like typical *glacialis* in the form of this structure, and it is longest in some of the North Bay and Algonquin Park specimens, shortest in the Pennsyl-

vania series. Some from North Bay, however, have the furcula as short as those from Lake Simcoe (figs. 56, 57, 58.)

5. Cerci of ♂.—Next to the furcula this structure shows the greatest range of variation. It is much stouter in typical *glacialis* than in typical *variegata*, and Scudder used the character as one of the chief ones by which the two species could be distinguished. A glance at the plate, however, will suffice to show that no separation into two species can be based on the form of this structure. Some of the North Bay specimens have the cerci of typical *glacialis*, but there is a perfectly gradual series of transitions from the stout cerci of the more northern forms to those of the Pennsylvania ones, in which they are most slender. In order to illustrate these transitions as accurately as possible, I have drawn the cerci of all the ♂ specimens, from N. E., North Bay, Algonquin Park, Tobermory and Pennsylvania, and a sufficient number from L. Simcoe to complete the range of variation.

Other variations of less importance are to be found, especially in the general colour and character of markings, but they add nothing to the facts gained from the above.

From these comparisons it is readily seen that the specimens from Mt. Washington and those from Pennsylvania are the most widely separated, but that the wide gaps between them can be filled by a complete series of links represented by the Canadian specimens, the most northern of which closely approach the N. E. specimens, the most southern the Pennsylvania ones.

These variations, hence, appear to be connected with differences in the climatic conditions, and it would seem that temperature is an important factor. They are also accompanied by certain changes in the insect's habits, as evinced by some interesting facts that have been recorded on this subject. Mr. Scudder states that in the White Mts. *P. glacialis* "frequents the close branches of the dwarf birch, and is rarely or never seen upon the ground," while Mr. Morse found most of his specimens "on or among the various species of *Vaccinium*, characteristic of mountain-tops and on Ascutney upon dwarf cornel" (Psyche, 1898, 273). It occurs at elevations of 2,000 to 5,400 feet, in New England, New York and Pennsylvania, but has also been taken at lower levels at Jackman, Me., on the Canadian border, "in open woods and bogs" (Harvey.—Psyche, 1897, 77). At North Bay and Algonquin Park I found the insect common in open woods on bushes, chiefly the common beaked hazel

(Corylus rostrata) and the red raspberry. It occurs in both dry and fairly moist situations. The specimens from Tobermory were taken under similar circumstances, while at De Grassi Pt. they seem to be confined to swampy ground where the vegetation is of a boreal character. In such places I have taken them on bushes, chiefly raspberry, but have often found them on the branches and trunk of the Arbor-vitæ, sometimes 8 or 10 ft. from the ground. I have never observed this habit in the north, although the species is far more abundant there, but Mr. J. A. G. Rehn says, in an interesting article on "The Habits and Distribution of *Podisma variegata*" (Ent. News, XI., 630), that in Pennsylvania they occur on the branches of hemlock, and that when removed they will quickly return.

From these various facts it may be inferred that *P. glacialis* is the more primitive form, especially as the genus is typically an alpine one, and that it once inhabited a much larger area, but after the retreat of the ice-sheet it disappeared from this area, except in the northern part and on the mountains farther south. *Variegata*, on the other hand, may be regarded as an incipient species, the product of an effort on the part of the parent species to survive amid the altered conditions of its environment. These conditions, as we go southward, diverge more and more from those to which the insect was originally adapted, and hence it is not surprising to find slight modifications of structure and colour-pattern corresponding in degree with these changes.

Its occurrence in swampy stations southward is what would be expected from the fact that wet soil is a poor conductor of heat, and such places are cooler than the more open, dry country, but its fondness for hemlock in Pennsylvania seems to indicate a distinct specialization in the insect's habits in this locality. Further observation, however, is desirable on this point.

As many of my Canadian specimens can be classed equally well with *glacialis* or *variegata*, it will be necessary to give a new racial name to these forms, and I have accordingly subdivided the species as follows, though it will be understood that these different geographical races cannot be sharply separated from one another:

A. Antennæ distinctly shorter than hind femora (♂), nearly three-fourths as long (♀). Eyes not very prominent. Hind femora nearly uniform green externally, obscurely bifasciate with darker green. Furcula crossing basal fourth or fifth of supra-anal plate. Cerci of

♂ rather stout, middle breadth not less than two-thirds the basal breadth.

Habitat—Mountains of New England.—*P. glacialis*, Scudd., type.

B. Antennæ about as long (♂), about five-sixths as long (♀) as the hind femora. Eyes prominent, especially in the ♂. Hind femora green externally, more or less distinctly bifasciate with darker green, especially on the superior sulcus. Furcula generally crossing less than the basal fifth of the supra-anal plate, but longer than the last segment. Cerci of ♂ about half as broad in middle as at base. Habitat—Northern Ontario.—*P. glacialis Canadensis*, new race.

C. Antennæ longer (♂), faintly shorter (♀), than hind femora. Eyes prominent, especially in the ♂. Hind femora pale-yellow externally, strongly bifasciate with dark-brown or blackish. Furcula about as long as the last segment. Cerci of ♂ less than half as broad in middle as at base. Habitat—New York, Pennsylvania, Ontario (L. Simcoe, Tobermory).—*P. glacialis variegata*, Scudd.

Specimens from Lake Simcoe and Tobermory may be placed with *variegata*, but are not quite typical. I have seen no specimens of *glacialis* from the mountains of New York and Pennsylvania, so that I have given them no place in the above table. They will probably fall under *P. glacialis* type.

MEASUREMENTS.

Males.

	Antenna.	Head and Pronotum.	Hind Femur.	Body.
	mm.	mm.	mm.	mm.
Mt. Wash. 3 spec.	8.1–8.2 Av. 8.15 (2 spec.)	5.5–5.8 Av. 5.53	9.5–9.7 Av. 9.57	17.0–17.5 Av. 17.3
Speckled Mt. 3 spec.	9.0–9.2 Av. 9.1 (2 spec.)	5.7–5.8 Av. 5.73	9.0–9.7 Av. 9.4	17.0–18.0 Av. 17.7
New England. (Morse) 48 spec.	8.0–9.0		9.5–10.8	15.0–17.5
North Bay. 8 spec.	8.5–9.0 Av. 8.8	5.4–5.8 Av. 5.62	9.5–10.3 Av. 9.9	17.0–18.0 Av. 17.27
Algonq Pk. 14 spec.	8.0–10.0 Av. 8.66	4.8–5.7 Av. 5.19	8.4–10.0 Av. 8.8	15.0–17.5 Av. 16.1
Tobermory. 5 spec.	10.0–10.5 Av. 10.16	5.7–6.0 Av. 5.84	10.0–10.8 Av. 10.24	17.5–18.5 Av. 18.44
Lake Simcoe. 14 spec.	10.0–11.0 Av. 10.5	5.3–6.3 Av. 5.79	9.5–10.5 Av. 10.08	17.5–20.0 Av. 18.4
Penn'a. 4 spec.	12.0 (1 spec.)	5.3–5.8 Av. 5.52	9.5–10.2 Av. 9.8	16.5–18.5 Av. 17.5
Ithaca, N. Y. (Scudder).	10.5		9.25	16.5

Females.

	Antenna.	Head and Pronotum.	Hind Femur.	Body.
	mm.	mm.	mm.	mm.
Mt. Wash. 1 spec.	7.2	7.0	12.0	25.0
Speckled Mt. 3 spec.	8.2–9.0 Av. 8.6 (2 spec.)	6.3–7.0 Av. 6.6	10.0–11.5 Av. 10.9	21.0–26.0 Av. 23.0
New England. (Morse) 62 spec.	7.0–8.5		10.0–12.0	19.0–28.0
North Bay. 5 spec.	9.0–10.5 Av. 9.9	6.3–7.0 Av. 6.86	12.0–12.6 Av. 12.4	21.5–25.2 Av. 23.9
Algonq Pk. 4 spec.	9.0–9.2 Av. 9.1	6.0–6.8 Av. 6.47	10.2–12.0 Av. 11.2	20.0–24.0 Av. 21.7
Tobermory. 5 spec.	9.0–11.0 Av. 10.12	6.5–7.5 Av. 7.09	12.2–13.5 Av. 12.3	22.0–26.5 Av. 24.8
Lake Simcoe. 8 spec.	10.0–11.0 Av. 10.69	6.8–7.8 Av. 7.29	11.0–13.4 Av. 12.4	24.5–26.5 Av. 25.37
Penn'a. 3 spec.	11.5 (1 spec.)	6.5–7.0 Av. 6.66	12.0–12.5 Av. 12.25	21.0–24.5 Av. 22.83
Ithaca, N. Y. (Scudder).	8.5 +		12.75	23.5

Explanation of Plate 6.

Fig.

1, 2, 7. *Podisma glacialis*, type, ♂ cercus. Mt. Washington, N. H.
3, 4. " " " " Greylock Mt., Mass.
5, 6, 8 " " " " Speckled Mt., Stoneham, Me.
9. " " " " From Scudder (Rev. Mel.).
48. " " " ♂, head and pronotum. Mt. Washington, N. H.
49. " " " " " " Speckled Mt., Me.
53. " " " ♂, supra-anal plate and furcula. Speckled Mt., Me.
61. " " " ♂, hind femur. Speckled Mt., Me.
10–17. " " *canadensis*, ♂ cercus. North Bay, Ont.
18–31. " " " " Algonquin Park, Ont.
50. " " " ♂, head and pronotum. North Bay, Ont.
54–56. " " " ♂, supra-anal plate and furcula. North Bay, Ont.
62, 63. " " " ♂, hind femur. North Bay, Ont.
32–36. " " *variegata*, ♂ cercus. Tobermory, Bruce Co., Ont.
37–42. " " " " Lake Simcoe, Ont.

43.	*Podisma glacialis, variegata*, ♂			cercus.	From Scudder (Rev. Mel.).
44, 45.	"	"	"	"	North Mt., Penn'a.
46.	"	"	"	"	Bellasylva, Wyo. Co., Pa.
47.	"	"	"	"	Glen Omoko, Sull. Co., Pa.
51.	"	"	"	♂, head and pronotum.	Lake Simcoe, Ont.
52.	"	"	"	" " "	North Mt., Pa.
57, 58.	"	"	"	♂, supra-anal plate and furcula.	Lake Simcoe, Ont.
59, 60.	"	"	"	♂, supra-anal plate and furcula.	North Mt., Pa.
64.	"	"	"	♂ hind femur.	Lake Simcoe, Ont.
65.	"	"	"	" "	Bellasylva, Pa.

ON THE SYSTEMATIC POSITION OF THE ORTHOPTEROUS GENUS AULOCARA, SCUDDER.

BY A. N. CAUDELL, WASHINGTON, D. C.

Too late for correction, I find that in my recent paper on western Orthoptera* I have redescribed Scudder's *Aulocara rufum* as a new species under the name *guanieri*, placing it in the not very nearly related genus *Heliastus*. This unfortunate mistake was brought about by the uncertain position of the genus *Aulocara*, which possesses both tryxaline and œdipodine characters. The general aspect of the species of the genus is certainly very strongly œdipodinean and the characters of the declivate vertex, subperpendicular front, filiform antennæ, small round eyes, obsolete lateral carinæ, twice or thrice severed median carina, wrinkled pronotum, and of the generally present intercalary vein, all indicate close affinity to the Œdipodinæ. McNeill, in his revision of the Tryxalinæ†, excludes this genus, but Scudder considers it to belong to that group. *Œdocara*, Scudd., and the invalid genus *Coloradella* of Brunner von Wattenwyl‡, are synonyms of *Aulocara*, and under the former name Saussure places it in the Œdipodinæ§, and *Coloradella* was established as a tryxaline genus. Thus there is considerable difference of opinion among specialists as to the systematic position of *Aulocara*. Upon thoroughly studying the group characters exhibited by our species of this genus, I feel very certain that its logical position is in the Œdipodinæ.

* Proc. U. S. Nat. Mus., xxvi., 775–809 (1903)
† Proc. Davenp. Acad. Nat. Sc., vi., 179–274 (1897).
‡ Ann. Mus. Genoa (2) xiii., 123 (1893).
§ Prodr. Œdipod., suppl., 15 (1888).

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, M. A., D. SC., ASSISTANT CURATOR, U. S. NATIONAL MUSEUM.

(Paper No. 16.—Continued from Vol. XXXV., p. 205.)

Family XLII.—Mutillidæ.

1830. Mutillidæ, Family (partim), Leach ; Edinb. Ency., IX., p. 145.

1855. Mutillidæ, Family (partim), Smith ; Cat. Hym. Brit. Mus., III., p. 1.

1899. Mutillidæ, Family XLII., Ashmead ; Journ. N. Y. Ent. Soc., VII., p. 49.

1899. Mutillidæ, Family (partim), Fox; Trans. Am. Ent. Soc., XXV., p. 220.

1899. Mutillidæ, Famille (partim), André ; Spec. Hym. d'Eur. Tom. VIII., pp. 1–77.

1903. Mutillidæ, Famille (partim), André ; Wytsman's Gen. Ins., Fam. Mutillidæ.

William E. Leach, and *not* Frederick Smith, as Ernest André has it, was the first to establish the family *Mutillidæ ;* but none of these gentlemen correctly defined it, and all have included genera which do not belong to it. Some of the genera belong to the *Bethylidæ*, one belongs to the *Thynnidæ*, one to the *Cosilidæ*, and others to the *Myrmosidæ*.

The family, as here restricted, contains only wingless females, with the thorax always undivided, or without trace of the pronotal or mesonotal sutures, while the males are easily distinguished from those in other families by having the abdomen terminating in two slender, straight spines, which usually project from between the two plates of the pygidium—the epipygium and the hypopygium. All other writers on these wasps, namely, Klug, Lepeletier, Leach, Haliday, Radoszkowski, Sichel, Smith, Saussure, Blake, Cresson, Fox, Peringuey and André, have, in my opinion, included in the family genera or groups which do not belong to it, but which fall naturally into other families, as I have clearly shown in my characterization of the families. All its members are genuine parasites, and live in the nests of various bees and wasps. The family may be separated into *two* closely-allied subfamilies, as follows :

Table of Subfamilies.

Abdomen with the first segment *broadly sessile* with the second, *without* a distinct constriction or furrow between, and never much narrowed or petioliform, although sometimes subnodose in some males..... Subfamily I., Mutillinæ.

Abdomen with the first segment *petiolate* or *petioliform*, never broadly sessile with the second, but much narrowed at apex, and usually *with* a constriction or furrow between it and the second.....Subfamily II., Ephutinæ.

SUBFAMILY I.—Mutillinæ.

This group has apparently reached its highest development in Europe, Africa and Asia, the typical forms found in America being less numerous; the others show a closer affinity with the next subfamily or the *Ephutinæ*, tribe *Sphaerophthalmini.*

Two minor groups or tribes may be recognized by the following characters:

Eyes small, rounded, hemispherical or ellipsoidal, prominently convex, smooth and highly polished, not facetted, or with the facets vaguely defined, except in ♂ *Tricholabiodes*, *Pseudophotopsis* and *Alloneurion*, which have large oval eyes, more or less facetted, that extend to the base of the mandibles.....Tribe I., Photopsidini.

Eyes larger, not rounded or hemispherical, ovate, obovate or ellipsoidal, always distinctly facetted, and in the ♂ sometimes emarginate within.....Tribe II., Mutillini.

TRIBE I.—Photopsidini.

The majority of the males in this group more closely resemble those in the family Myrmosidæ, tribe *Chyphotini*, than any of the others, and this resemblance has influenced me in placing the tribe at the head of the family *Mutillidæ*, although in cephalic characters, and particularly in the rounded eyes, they are evidently allied to the tribe *Sphaerophthalmini*, some of the females having been described originally in the genus *Sphaerophthalma*, Blake.

Table of Genera.

Males.....1.

Females.....20.

1. Eyes large, oval, not hemispherical, occupying most of the sides of the head and extending to base of mandibles, usually with a feeble sinus in front and behind, delicately facetted.....2.

Eyes not large, hemispherical or rounded.....4.

2. Postscutellum armed on each side with a small erect tooth or spine; mesonotum with complete furrows .....3.

Postscutellum normal, unarmed.

Front wings with three cubital cells, the third sometimes incomplete, the stigma very small and indistinct; only *one* recurrent nervure; mandibles strongly excised beneath, 3-dentate at apex; middle and hind tibiæ armed with spines. (Africa).....Tricholabiodes, Radoszkowski.
(Type Mutilla pedunculata, Klug.)

3. Front wings with *two* cubital cells and only *one* recurrent nervure; both mandibles excised beneath, with a process or projection before the incision; ocelli large. (Africa, Asia.).....Pseudophotopsis, André.
(Type Agama Kamarovi, Radosz)

Front wings with *three* cubital cells and with *two* recurrent nervures, the third cubital cell again divided by a longitudinal vein issuing from the middle of the second transverse cubitus. (Asia).....Alloneurion, Ashmead.
(Type Mutilla Kokpetica, Radosz.)

4. Mesosternum anteriorly normal, unarmed.....5.

Mesosternum anteriorly abnormal, armed with *two* (or more) teeth.

Head quadrate, the temples full; mandibles at apex 4-dentate; mesosternum laterally at the middle armed with a tooth; first joint of the flagellum as long or nearly as the second. (North America.).....Tetraphotopsis, Ashm., gen. nov.
(Type T. Hubbardi, Ashm.)

Head not quadrate, the temples not full; mandibles at apex 3-dentate; mesosternum laterally unarmed; first joint of the flagellum shorter than the second. (North America.).....Odontophotopsis, Viereck.
(Type O. exogyrus, Viereck.)

5. Marginal cell at apex pointed or rounded, but never broadly truncate..... 6.

Marginal cell at apex broadly, squarely truncate .....15.

6. Mandibles beneath *excised,* or with a sinus and usually with a tooth, or process, before the incision, or at least the left mandible excised beneath .....7.

Mandibles beneath *simple*, not excised.....9.

7. Mandibles acuminate, or with a tooth within before apex, never 3-dentate ..... 14.

Mandibles stout and strong throughout, at apex 3-dentate.

Front wings with only *one* recurrent nervure ..... 8.

Front wings with *two* recurrent nervures .....13.

8. Ocelli large ; submedian cell a little longer than the median ; first and second joints of the flagellum cylindrical, more than twice longer than thick, and about equal in length. (North America.).....Neophotopsis, Ashm., gen. nov.
(Type Photopsis pluto, Fox.)

Ocelli small ; submedian cell not longer than the median ; first joint of the flagellum a little longer than thick and shorter than the second. (North America.)..... Bruesia, Ashm., gen. nov.
(Type Mutilla harmonia, Fox.)

9. Front wings with *three* cubital cells, or the third partially formed..12.

Front wings with *two* cubital cells, the third entirely absent.

Mesonotum *with* distinct parapsidal furrows.....10.

Mesonotum *without* parapsidal furrows.....11.

10. Mandibles at apex 3-dentate.

Front wings with two cubital cells. (North America.)..... Neophotopsis, Ashm. (partim).

11. Second cubital cell triangular ; ocelli large ; flagellum cylindrical, the first joint longer than wide, but shorter than the second. (North America.).....Micromutilla, Ashmead.
(Type Photopsis nana, Ashm.)

Second cubital cell small, irregularly pentagonal ; ocelli not large, close together in a triangle. (South America.) ..... Scaptodactyla, Burmeister.
(Type S. heterogama, Burm.)

12. Mandibles strong, 3-dentate at apex.

Front wings with only *one* recurrent nervure ; first abdominal segment smooth, or at most only sparsely feebly punctate ..... Neophotopsis, Ashm. (partim).

Front wings with *two* recurrent nervures ; first abdominal segment distinctly, closely punctate.....Photopsis, Blake (partim).

13. Ocelli large; submedian cell not or rarely much longer than the median; first abdominal segment closely punctate. (North America.) ..... Photopsis, Blake.
(Type P. imperialis, Blake.)

Ocelli small; submedian cell longer than the median; first abdominal segment smooth, impunctate. (North America.) ..... Nomiæphagus, Ashmead.
(Type Mutilla Sanbornii, Blake.)

14. Ocelli large; submedian cell a little longer than the median; *two* recurrent nervures, the second, however, sometimes incomplete or subobsolete at apex; first joint of the flagellum about twice as long as thick. (North America.) ..... Pyrrhomutilla, Ashmead.
(Type Sphærophthalma anthophoræ, Ashm.)

15. Mesonotum *without* parapsidal furrows ..... 16.
Mesonotum *with* parapsidal furrows ..... 18.

16. Thorax about twice as long as wide, not wider than the head..... 17.
Thorax not much longer than wide, wider than the head.

Submedian cell not longer than the median; flagellum cylindrical, tapering off at apex, the fourth joint not much longer than the second; second ventral segment more or less conically produced or elevated at basal middle. (Australia.) Eurymutilla, Ashmead.
(Type Mutilla affinis, Westw.)

17. Submedian cell longer than the median; flagellum cylindrical, the first joint shorter than the second; second ventral segment normal. (Australia.) ..... Ephutomorpha, André.
(Type Mutilla aurata, Fabr.)

18. Front wings with *two* cubital cells ..... 19.
Front wings with *three* cubital cells.

Head subglobose; ocelli small. Australia. Bothriomutilla, Ashmead.
(Type Mutilla rugicollis, Westw.)

19 Head subquadrate; ocelli small; mandibles excised beneath, 2- or 3-dentate (*teste* André.) (South America.) ..... Tallium André.
(Type Mutilla tenebrosa, Gerst.)

20. Thorax not or hardly twice as long as wide, usually narrowed posteriorly, but never very elongate ..... 21.
Thorax elongate, thrice as long as wide, or nearly, obpyriform.... 29.

21. Thorax at least 1½ times as long as wide, obtrapezoidal, obovoid, obpyriform, or banjo shaped, or nearly ..... 24.

Thorax not or only a little longer than wide, quadrate or nearly, obtrapezoidal, short ovoid or otherwise shaped.

Thorax obtrapezoidal or short ovoid.....22.

Thorax hexagonal, a little wider than long, punctate ; head subglobose ; first and second joints of the flagellum only a little longer than thick. (Australia)..Eurymutilla, Ashmead. (Type Mutilla affinis, Westw.)

22. Thorax at least 1½ times as long as wide .....24.

Thorax obtrapezoidal and only a little longer than wide.

Mandibles excised beneath.....23.

Mandibles not excised beneath.

Mandibles conically pointed edentate; first and second joints of the flagellum small, not longer than wide, the third joint longer than the second ..Micromutilla, Ashmead.

Mandibles falcate, but with a small tooth within before the apex; first joint of the flagellum much longer than wide and longer than the second..Neophotopsis, Ashmead.

23. Mandibles decussate, acute at apex, but with a minute tooth within before the apex.... .....? Odontophotopsis, Viereck.

24. Thorax banjo-shaped, or nearly.....32.

Thorax obovoid or obpyriform.

Head transverse quadrate, the temples broad ; eyes oval or ellipsoidal ; highly polished.

Mandibles long, acuminate decussate, edentate, first joint of the flagellum long, obconical, longer than the 2nd and 3rd united....? Neophotopsis, Ashm.

Thorax obtrapezoidal.

Head subglobose, the temples rather broad ; eyes ellipsoidal or nearly round.

Scape very long ; first joint of flagellum very long ; mandibles long, slender, pointed at apex, with *two* teeth within..... .Scaptodactyla, Burmeister.

Scape normal ; first joint of flagellum not especially long.

Left mandible *with* an incision beneath toward base.

Mandibles bidentate; first joint of the flagellum long, fully as long as 2nd and 3rd united..? Tetraphotopsis, Ashm.

Mandibles acuminate, decussate, without teeth; first joint of the flagellum obconical, longer than the second..?Neophotopsis, Ashm.

Left mandibles *without* an incision beneath, simple.....? genus.

24. Thorax banjo-shaped, or nearly, much contracted at the sides....32.
Thorax obpyriform, obovoid or obtrapezoidal.....25.

25. Mandibles beneath simple, not excised.....26.
Mandibles beneath, or at least the left mandible, excised and usually with a process or projection before the incision.....28.

26. Mandibles at apex 3-dentate.....27.
Mandibles at apex simple or at most with a small tooth within before apex, or bidentate.

Head rather large quadrate or subquadrate, the temples broad.....Nomiæphagus, Ashmead.

27. Head subglobose, the temples not especially broad, the antennal foveæ not deep, without a carina superiorly...Brusia, Ashmead.

28. Pygidium smooth, *without* a pygidial area; eyes short, oval.....Tricholabiodes, Radoszkowski.
Pygidium not smooth, *with* a pygidial area.

Body bare or nearly, at the most clothed with a sparse pubescence.

Mandibles edentate, pointed at apex; first joint of the flagellum not, or scarcely, longer than wide, and very little longer than the second. Photopsis, Blake.

Body clothed with a dense pubescence.

Mandibles acuminate, but with a slight tooth within before apex.....Pyrrhomutilla, Ashmead.

29. Thorax coarsely, rugosely punctate, pitted or foveolated, the front margin truncate, the angles acute or toothed, the lateral margins *with* a prominent tooth at the beginning of the contracted portion or in the tegular region.....30.
Thorax not coarsely, rugosely punctate or pitted, although punctate, the front angles rounded, the lateral margins *without* a tooth. 31.

30. Head above bare ; mandibles stout edentate, antennal foveæ bounded by a sharp carina superiorly ; first joint of the flagellum twice as long as the second.....Bothriomutilla, Ashmead.

Head above clothed with a dense, white pubescence ; mandibles elongate, pointed at apex ; antennal foveæ not bounded by a carina superiorly ; first joint of the flagellum only a little longer than the second (South America).....Leucospilomutilla, Ashm., gen. nov.
(Type Mutilla cerberus, Klug.)

31. Head transverse or subglobose, bare or nearly ; the eyes rounded, very prominent ; antennal foveæ bounded by a carina superiorly ; mandibles edentate ; first joint of the flagellum much longer than the second (Australia)..... Ephutomorpha, André.
(Type Mutilla aurata, Fabr.)

32. Head large, subquadrate, somewhat wider than the thorax, but with the hind angles rounded and beneath normal, unarmed ; mandibles long, bidentate (South America).....Tilluma, André.
(Type Mutilla spinosa, Swederus.)

Head very large, quadrate, wider than the thorax, the hind angles acute, and armed on each side beneath with a strong tooth ; mandibles long, acute, with a tooth within much before the middle (South America).....Atillum, André.
(Type Mutilla bucephala, Perty.)

A NEW ANOPHELES WITH UNSPOTTED WINGS.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Anopheles Barberi, new species.—Near *Walkeri*, but only about half as large, the upright forked scales of the occiput chiefly yellowish-white, body devoid of scales, etc. Black, the base of the antennæ, clypeus, stems of halteres, coxæ and trochanters yellow, thorax and scutellum yellowish-brown, front portion of the former and the pleura more yellowish, occiput devoid of appressed scales ; thorax somewhat polished, thinly bluish-gray pruinose, the hairs and bristles chiefly black, those of the abdomen mostly yellowish, of the coxæ yellow ; femora with a distinct bluish tinge, tarsal claws simple ; wings hyaline, the scales brown, the lateral ones lanceolate, petiole of first submarginal cell about one-third as long as that cell, base of the latter much nearer the base of the wing than that of the second posterior cell, hind crossvein less than its length from the small crossvein ; length, 3 mm.

Three females, collected August 14th, 1902, and August 17 and 19, 1903, on Plummer's Island, Maryland, by Mr. H. S. Barber, after whom the species is named. Type No. 6959, U. S. National Museum.

NOTES ON CULICIDÆ AND THEIR LARVÆ FROM PECOS, NEW MEXICO, AND DESCRIPTION OF A NEW GRABHAMIA.

BY FRED. V. THEOBALD, M. A., BRITISH MUSEUM, LONDON, ENG.

A small collection of mosquitoes has been sent me by Dr. Grabham, collected by himself and Mr. T. D. A. Cockerell at Pecos Canon, New Mexico, U. S. A.

This collection was made in June and contains five species, namely:

1. *Theobaldia incidens*, Thomson.
2. *Culex Kelloggii*, Theobald.
3. *Culex consobrinus*, Desvoidy.
4. *Grabhamia Curriei*, Coquillett.
5. *Grabhamia vittata*, nov. sp.

1. The *Theobaldia incidens*, Thomson (5 ♀ s), show very evident pale leg banding on the hind legs in one or two specimens, and the position of the posterior cross-vein also varies, for one has it just before the mid cross-vein, another specimen just behind the mid. They were taken on the 18th, 27th and 29th of June. The largest specimen measures 11 mm. in wing expanse.

2. *Culex Kelloggii*, Theobald. (Canad. Entom., Vol. XXXV., p. 211, 1903.—(5 ♂ s and 1 ♀). This species was bred by Dr. Grabham from long-siphoned larvæ and only a very few specimens were found. They are quite typical, but the ♂ s are much smaller than the type, one only being 4 mm. long. They were bred from the 19th to the 27th of June.

The larva of C. Kelloggii.—Head bright testaceous; eyes black, a black band behind; antennæ black, at the apex acuminate, ending in three long black spines and one very small one; just above the junction of the dark and pale areas is a fan-shaped set of hairs. Thoracic hairs as follows: The frontal band composed of two large median triple hairs, a couple of small ones next, then two single ones, followed by two triple ones outside; the next lateral area composed of two outer densely compound groups, then on the inside a double and single hair; third area composed of two compound bunches. The siphon as long as the three preceding segments, pale testaceous black at the apex and with a black basal ring and black spot, a row of small bristles on its basal half and a line of fine hair tufts on the apical portion, these are four in number

and rather more basal than shown in the figure; at its base three tufts of bristles on each side and a group of spines; anal segment with a few long black dorsal bristles and pale ventral fan; gill plates long and narrow. Characteristic basal spines shown at *a*.

Length.—8.5 to 9 mm.

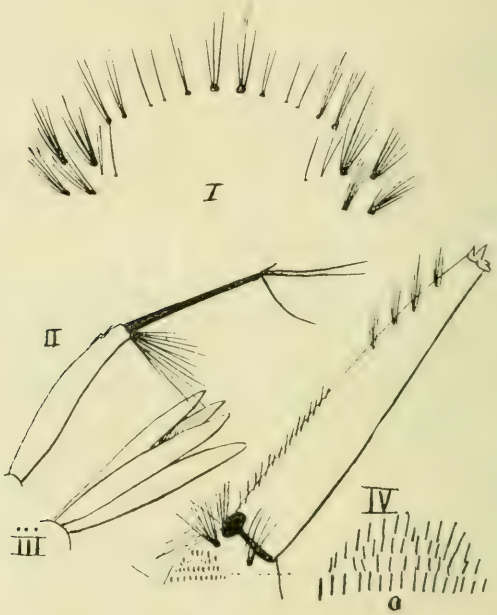


FIG. 14.—Culex Kelloggii, larva.

I. Thoracic frontal and lateral hairs; II. Antenna; III. Anal gills; IV. Respiratory siphon, *a* basal spines.

3. *Culex consobrinus*, Desvoidy.—One ♀ taken on June 21st. This species I do not think has been recorded so far south before.

4. *Grabhamia Curriei*, Coquillett. *Culex Curriei*, Coquillett. (Can. Entomol., p. 259, 1902.).—A series of 10 ♀s, varying greatly in size, the smallest 4.5 mm., the largest 6 mm. The metanotum is densely clothed with pale straw-coloured narrow curved scales with a median broad reddish-brown line, one or two show traces of narrow similarly-coloured lateral lines. They were taken from 20th to 29th of June, during the day, and were very troublesome and abundant. The four pairs of black abdominal spots on segments 2 to 5 are very marked.

5. *Grabhamia vittata*, n. sp.—Thorax clothed with rich reddish-brown scales and with two narrow broken creamy lines and a few pale scales at the sides, especially over the roots of the wings; pleura with dense gray scales. Abdomen blackish-brown with basal white bands; venter white. Legs brown, base of femora pale, remainder of femora

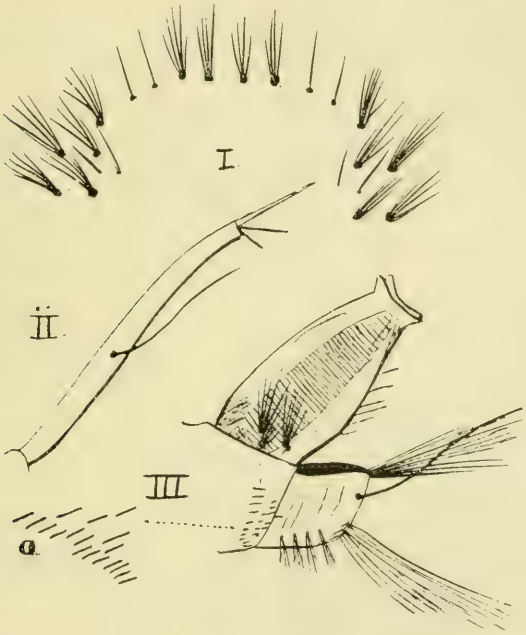


FIG. 15.—Grabhamia vittata, larva.
I. Thoracic frontal and lateral hairs; II. Antenna; III. Siphon, *a* basal spines.

and tibiæ mottled with white scales; some of the tarsi with basal white bands; last hind tarsal black; ungues of ♀ all uniserrated; of ♂ all uniserrated.

♀.—Head brown with narrow curved yellowish scales, palest in the middle, with numerous upright yellow and black forked scales, flat creamy-white lateral scales with a round patch of flat black ones in the middle of each white area, a pale border along the eyes, black bristles projecting over them, except in the middle where the bristles are golden; antennæ deep brown, basal joint and base of the second joint bright

testaceous ; proboscis deep brown ; palpi deep brown towards the apex ; joints testaceous, with a few golden and black hairs, apical joint long, as long as the rest of the palpi. Thorax deep brown, clothed with bright reddish-brown narrow curved scales, a narrow median black line and a narrow line of creamy scales on each side, also a few creamy scales in front, over the root of the wings and before the scutellum ; four rows of long dark bristles on the posterior half of the mesonotum ; scutellum brown with narrow curved pale creamy scales and long dark posterior border bristles ; metanotum pale brown ; pleura fawn coloured, densely-white scaled.

Abdomen deep blackish-brown with basal white bands and a few yellow scales on the apices of the last three segments ; border bristles pallid ; venter densely clothed with creamy-white scales. Legs with the coxæ pale, with creamy scales ; femora pale basally and ventrally, with scattered brown scales becoming densest towards the apex, extreme apex with a yellow spot ; tibiæ brown, mottled with pale scales, darkest towards the apex and with black bristles ; fore metatarsi and first two tarsal segments with narrow pale basal bands ; mid-tarsi the same as the fore ; hind legs with a pale basal band to the metatarsi and first three tarsal segments, last segment black ; all the ungues uniserrated.

Wings with brown scales except on the subcostal vein and one side of the first long vein, where they are mainly white, and also at the base of the costa ; the lateral vein-scales on the second, third, fourth and apex of the fifth veins long ; the first, third and fifth long veins with darker scales than the remainder ; fork-cells short, the first submarginal cell longer and narrower than the second posterior cell, its base about level with that of the latter, its stem slightly longer than half the length of the cell ; stem of the second posterior about the same length as the cell ; posterior cross-vein rather more than its own length distant from the mid cross-vein ; fringe dense, brown. Halteres with pale testaceous stem and fuscous knot.

Length.—4.2 to 5.5 mm.

♂.—Palpi brown with a white band at the base of the two apical joints, plume hairs brown, yellow opposite the pale basal areas, there is also a pale band on the long antepenultimate joint, the last two joints of nearly equal length, the apical one slightly the shorter ; apex of the antepenultimate swollen. Antennæ with brown plume hairs tipped with grayish-yellow ; scales of the head gray. Thorax with looser, more

scattered, reddish-brown scales in the middle, gray ones at the sides. Abdomen as in the ♀. Legs banded as in the ♀, but the pale basal bands more of a yellow hue.

Fork-cells very small; first submarginal a little longer and much narrower than the second posterior, its base a little the nearer the apex of the wing, its stem a little longer than the cell; stem of the second posterior cell also longer than the cell; posterior cross-vein about one and a half times its own length distant from the mid.

Fore and mid ungues unequal, both uniserrated, the larger mid ungues rather straighter than the much-curved fore one; hind ungues equal, prominently uniserrated. Basal lobes of genitalia very hairy, claspers narrow, thin, terminating in a longish spine.

Length.—4.5 to 5 mm.

Habitat.—Pecos Canon, New Mexico, U. S. A.

Time of capture.—June 16th to 29th.

Observations.—A very abundant species, according to Dr. Grabham, caught after sunset. It varies very much in size, the smallest specimen being 4 mm., the largest 5.5 mm. The ♂ has evidently a variable adornment on the thorax and is peculiar in having the hind ungues uniserrated.

The species can easily be told from any other *Grabhamia* with banded legs by the basally-banded abdomen and last hind tarsal being black and the white-scaled sub costal and first long vein. *G. dorsalis*, which it most nearly approaches, has the abdomen and thorax with different adornment and the legs basally and apically banded, not basally as in this species. The type is in the British Museum (Nat. Hist.).

The *larva.*—Head deep chestnut brown, eyes black, reniform, pale around; antennæ pale testaceous at the base, dark at the apex, terminating in two small spines and a third larger flattish pointed one, paler in colour; there is also a long lateral spine about half way down the antenna; mouth whorls bright golden-yellow; thorax and abdomen pale brown with a double darker dorsal line, the front of the thorax with four tufts of black hairs in the middle in front, then two separate hairs and then another tuft on each side, two pairs of long lateral tufts, the first pair with two single black bristles just behind them and a little more centrally placed; the first two abdominal segments with large lateral tufts, remainder with small ones; siphon short and thick, deep brown, about as long as the penultimate and antepenultimate segments; a few

tufts of hair near its base and also a patch of characteristic spines shown at *a*. The last segment has a single dorsal tuft with a large bristle below it; the ventral fan rather long and prominent and four ventral small tufts.

Length.—When mature, 9 mm.

The *pupa* has cylindrical siphons contracted towards the apex, with small, slightly-oblique, opening; there is a dense median tuft on the first abdominal segment. The anal fins are large, rounded, with median rib and double-contoured border towards the base of each fin; a distinct apical dorsal tuft on the last segment.

Length.—5 mm., with anal fins 6 mm.

HESSIAN FLY REARED IN THE LABORATORY.

BY F. L. WASHBURN, ST. ANTHONY PARK, MINN.

It has always been claimed that there is but one brood of Hessian Fly in Minnesota. On June 25th of current year larvæ of Hessian Fly in second stage were found working on wheat in an adjoining county, brought to the Experiment Station and the wheat plant placed in moist sand in breeding jar in laboratory. These specimens quickly formed puparia, and one fly, a female, emerged July 19th. She lived about two days, before dying depositing between 80 and 90 eggs on green blade of wheat and on dried wheat stem in breeding cage. The eggs were laid indiscriminately on leaf and stem, some singly, some in clusters of two or three and some in strings attached by ends.

On July 1st one larva was found in field in first stage, brought into laboratory on wheat plant, but did not live.

On the same day larvæ in second stage were secured and placed in breeding jar in laboratory. Upon July 8th they formed puparia, and on Aug. 16th one female emerged. She died Aug. 18th without ovipositing.

The season here has been cold and damp, ideal condition for Hessian Fly. Probably more favorable conditions existed outside than in the laboratory.

LIST OF CANADIAN COLEOPTERA.

BY JOHN D. EVANS, TRENTON, ONT.

(Continued from page 292.)

Chrysomelidæ.

6550, Orsodachna atra, Ahr., '79, '80.
*6590, Coscinoptera dominicana, Fab., '80.
*6592, " vittigera, Lec., '79.
6610b, Bassareus pretiosus, Melsh., '80.
6614a, Cryptocephalus notatus, Fab., 80.
*6626, " confluens, Say, '79.
*6633, " calidus, Suffr., '80.
6683, Pachybrachys carbonarius, Hald., '79.
6690, " atomarius, Melsh., '80.
" sp., '79.
Graphops, sp., '80
6778, Nodonota tristis, Oliv., '80.
6778a, " convexa, Say, '79.
6778b, " puncticollis, Say, '79, '80.
6781, Entomoscelis adonidis, Fab., '79, '80.
6783, Prasocuris vittata, Oliv., '80.
6795, Chrysomela exclamationis, Fab., '79, '80.
6796, " conjuncta, Rog., '79, 80.
6799, " suturalis, Fab., '79.
* " " " var. pulchra, Fab., '81.
6807, " lunata, Fab., '79, '80, '81.
6808, " scalaris, Lec., '80.
6809, " Philadelphica, Linn., 80.
6810, " multipunctata, Say, '79.
6810a, " Bigsbyana, Kirby, '79, '80, '81.
*6831, Gastroidea dissimilis, Say, '79, '80.
6833, " formosa, Say, '79.
6837, Lina lapponica, Linn., '79.
*6838, " tremulæ, Fab., '79.
6839, " scripta, Fab., '79, '81.
6843, Gonioctena pallida, Linn., '81.
6844, Phyllodecta vulgatissima, Linn., '81.
6848, Phyllobrotica discoidea, Fab., '79.
6892b, Trirhabda Canadensis, Kirby, '79, '80.

*6894, Trirhabda attenuata, Say, '79, '80.
6898, Adimonia externa, Say, '79, '80.
6907, Galeruca decora, Say, '80, '81.
6909, " notulata, Fab., '81.
6915, " erosa, Lec., '79.
6932, Oedionychis vians, Ill., '79, '80.
6933, " lugens, Lec., '79.
6948, Disonycha alternata, Ill., '79, '80.
6950, " Pennsylvanica, Ill., '80.
6957, " triangularis, Say, '80.
6958, " collaris, Fab., '79.
6960, Haltica bimarginata, Say, '79.
6962, " carinata, Germ., '81.
6963a, " inærata, Lec., '79, '80, '81.
6968, " evicta, Lec., '79.
7023, Phyllotreta vittata, Fab. '80.
7060, Microrhopala vittata, Fab., '80.
7082, Odontota nervosa, Panz., '80.
7104, Coptocycla guttata, Oliv., '79.
" sp., '80.
7109, Chelymorpha argus, Licht., '79.

Bruchidæ.

*7124, Bruchus discoideus, Say, '80.
*7148, " fraterculus, Horn, '79.
" sp., '79.

Tenebrionidæ.

*7254, Asida opaca, Say, '80.
*7257, " polita, Say, '79, '80.
*7259, " sordida, Lec., '79.
*7291, Coniontis opaca, Horn., '79.
*7320, Eleodes tricostata, Say, '79, '80.
*7323, " obsoleta, Say, '79, '80.
*7327, " extricata, Say, '79, '80.
*7340, " hispilabris, Say, '79, '80.
*7357, " opaca, Say, '79, '80.
7401, Upis ceramboides, Linn., '79, '80, '81.
*10592, Blapstinus gregalis, Casey, '79, '80.
Paratenetus gibbipennis, Mots., '79.

Melandryidæ.

7653, Melandrya striata, Say, '79.

Cephaloidæ.

7759, Cephaloon tenuicorne, Lec., '81.

Mordellidæ.

7779, Mordella melæna, Germ., '79.
7783, " marginata, Melsh., '79.
" sp., '80.

Anthicidæ.

Stereopalpus, sp., '79.
7925, Notoxus anchora, Hentz., '79, '80.

Meloidæ.

8006, Meloe impressus, Kirby, '79, '80.
*8028, Nemognatha dichroa, Lec., '79, '80.
*8077, Epicauta puncticollis, Mann., '79.
*8078, " oblita, Lec., '79, '80.
*8083, " sericans, Lec., '79, '80.
*8084, " pruinosa, Lec., '80.
*8092, " maculata, Say, '79, '80.
8104, " Pennsylvanica, DeG., '79.
" sp., '79.
8132, Cantharis Nuttalli, Say, '79, '80.
8133, " cyanipennis, Say, '79, '80.
* " atrata, Fab., '80.

Rhynchitidæ.

8210, Rhynchites bicolor, Fab., '79, '80.

Otiorhynchidæ.

*8245, Ophryastes sulcirostris, Say, '79.
*8279, Nocheles æqualis, Horn, '80.
*8312, Tanymechus confertus, Gyll., '79.

Curculionidæ.

8348, Sitones tibialis, Hbst., '80.
*8357, Trichalophus simplex, Lec., '79.
8429, Phytonomus setigerus, Lec., '80.
8437, Lepyrus colon, Linn., '79, '81.
8444, Listronotus inæqualipennis, Boh., '79.
Macrops, 2 sp., '79.
" 2 sp., '80.

8482, Hypomolyx pineti, Fab., '81.
*8487, Lixus rubellus, Rand., '79.
*8497, " mucidus, Lec., '80.
*8514, Stephanocleonus cristatus, Lec., '79.
8543, Erycus puncticollis, Lec., 79, '80.
8615, Magdalis barbita, Say, '79.
8648, Anthonomus nigrinus, Boh., '79, '80.
*8659, " rufipes, Lec., '80.
8661, " cratægi, Walsh, '81.
*8842, Ceutorhynchus sericans, Lec., '80.
*11078, " erysimi, Fab., '80.

Calandridæ.

8939, Sphenophorus costipennis, Horn, '79.

Scolytidæ.

Hylesinus, sp., '80.

The genus and species of several specimens have not yet been determined.

GASTROPHILUS EPILEPSALIS, French.

BY F. L. WASHBURN, ST. ANTHONY PARK, MINN.

Dr. Burnside Foster, of St. Paul, a short time since sent me three Dipterous larvæ taken from the cutaneous tissue of a three-weeks-old infant, born on the seventh month, at Superior, Wisconsin. I at first thought the insect to be *Lucilia*, but being in doubt, and having no biological collection in this group for reference, I immediately sent it to Washington, receiving a telegram in reply that Mr. Coquillett had identified it as *Gastrophilus epilepsalis.*

In view of Prof. French's description of the type on page 263, Vol. 32, of this journal, taken with his account of the medical aspects of the case described, and in view also of Prof. Aldrich's objection to the nomenclature, page 318, op. cit., I regard this as an interesting find. Dr. Foster states that two of these maggots were from the neck, one from the palm of the hand and one from between the great toe and second toe on right foot, all of them in pustules similar to those made by some others of this genus. The child had been sleeping out of doors considerably during the daytime. The doctor proposes to write an account of the case in the forthcoming number of the St. Paul Medical Journal, of which he is editor.

It will be remembered that Prof. French named this species from a larva, great quantities of which were found in the evacuations of a child subject to periodic epileptic spasms. As these attacks ceased for a time after the use of purging medicines, by means of which large numbers of the maggots were voided, Prof. French appears to have assumed, curiously enough, that the spasms were caused by the *reproduction of the larvæ in the intestines* (the italics are mine) and the effect of the same on the nervous tissue; hence he gave the maggot the specific name *epilepsalis*.

In sending the above cutaneous larvæ found by Dr. Foster to Washington, I gave no data whatever, and yet they were declared identical with Prof. French's type, an intestinal parasite.

It is a pity no imagoes were reared from the larvæ. It appears probable that the species is badly named, for it evidently has no connection with epilepsy. In any event, much remains to be learned regarding it.

BOOK NOTICE.

CHECK LIST OF THE LEPIDOPTERA OF BOREAL AMERICA.—By John B. Smith, Sc. D., Professor of Entomology, Rutgers College, assisted by Henry Skinner, M.D., and W. D. Kearfoot (Kearfott), Philadelphia. American Entomological Society, June, 1903.

Prof. Smith has produced a new edition of his List of 1891, brought up to date. There seems a certain savour of rivalry in the appearance of this publication immediately after the Washington catalogue (Bull. 52, U. S. N. M.), especially as the Edwardsian names for the butterflies are again advanced. Still, there may be some excuse for the List in its smaller size and more compact form. The absence of a specific index is a great disadvantage. As a whole, the Washington catalogue has been copied, with a new set of numbers. There are some divergences, on which comment may be made. The most marked is Dr. Skinner's restoration of the Edwardsian names for the butterflies. I am sure this is a false position. As I have repeatedly said, there are probably too many genera in Dr. Scudder's system, but they must be fully studied. Prof. Grote has shown how it should be done in the Papilio group. A wholesale rejection of Dr. Scudder's work is not the way to solve the problem.

In the Sphingidæ Prof. Smith makes a few changes, hardly for the better. All the forms of *Hemaris tenuis* are given specific rank, which

shows a lack of attention to the work of Prof. Smyth. In the Saturniidæ, *Attacus*, Linn., is preferred to *Rothschildia*, Grote, and *Calosaturnia*, Smith, is revived for our American *Saturnia*. It would have been better if these changes had not been made. The Nolidæ are interpolated after the Lithosidæ, following Sir G. F. Hampson. They are really Tineids, as Dr. Chapman and I have shown. In the Nycteolidæ, *Earias obliquata*, Hy. Edw., again appears. I have been at pains to point out that it is a Pyralid, though it is perhaps not surprising that Prof. Smith overlooked this, since the species, unfortunately, was omitted in the Washington catalogue. *Cydosia* and *Cerathosia* again inject themselves into the Arctiidæ, in spite of the proof adduced by Prof. Grote and myself that this is not their correct position. The genus *Fenaria* appears in the Agaristidæ along with other genera which I refer to the Noctuidæ, but as *Fenaria* appears also in the Noctuidæ (p. 47), it leaves some doubt as to Prof. Smith's point of view.

In the Noctuidæ, Prof. Smith's changes in the specific names will prove the most valuable part of the list. I do not think he gives enough weight to Prof. Grote's work on the generic names; but this does not greatly matter in the interim of the appearance of Sir G. F. Hampson's volumes, which will settle these matters, I hope. *Psychophora* appears in the Noctuidæ and again in the Geometridæ. Is this a facetious attempt to express the variation in venation which we observed in the species *fasciata*? Mr. Beutenmüller gives a new version of Catocala.

The small families following the Noctuidæ are practically unchanged. I see that *Malacosoma pluvialis* and *M. ambisimilis* have fallen into the synonymy. I wonder if Prof. Smith ever compared the larvæ of *Californica* and *pluvialis*. If he had, he could hardly have made this synonymy without comment. May I not justly refer Prof. Smith to the words in his own preface: "It is not for the catalogue-maker to decide upon the validity of species and genera except where he has special knowledge"?

The Geometridæ, I presume, have not been changed. *Mycterophora* still masquerades as a Geometrid, though Prof. Smith might have properly transferred it to his Noctuid series. In the Limacodidæ, some unwarranted changes have been made. *Minuta*, Reak, is not *Shurtleffii*, Pack., and *Graefii* and *Fiskeana* are not *flexuosa*; *cæsonia*, *crypta* and *flavula* are good varieties, not synonyms. Some very bad advice has been followed here.

In the Pyralidæ and subsequent groups, Mr. Kearfott is responsible, and he follows my catalogue closely. I think it would have been better if the catalogue had been followed throughout and the same numbers retained. Many collectors use the list numbers in correspondence, and the divergences introduced will cause a certain inconvenience, not compensated for by the cases where the changes are an improvement on my catalogue. These cases are not numerous, and should have been left for a more general revision. HARRISON G. DYAR.

Mailed November 6th, 1903.

The Canadian Entomologist.

Vol. XXXV. LONDON, DECEMBER, 1903. No. 12

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, M. A., D. SC., ASSISTANT CURATOR, U. S. NATIONAL MUSEUM.

(Paper No. 17.—Continued from Vol. XXXV., p. 310.)

Tribe II.—Mutillini.

This tribe, to the initiated, is readily distinguished by the eyes, which are usually quite differently shaped, rarely smooth and shining, and always distinctly facetted, although a few females have small ellipsoidal or somewhat rounded eyes, as in the tribes *Photopsidini* and *Sphacrophthalmini*, and therefore, if the greatest care is not given to other characters, could be confused with certain genera in those tribes.

Table of Genera.

Males ..... 1.
Females ..... 28.

1. Eyes not large, oval, ovate or ellipsoidal, never emarginate within, distinctly facetted ..... 2.
Eyes large, always distinctly emarginate within ..... 13.
2. Apterous or subapterous forms ..... 3.
Fully winged forms ..... 8.
3. Subapterous or with rudimentary wings ..... 7.
Apterous or entirely without wings.
Thorax with distinct sutures, the scutellum more or less differentiated ..... 4.
Thorax without sutures, the scutellum not differentiated, entirely absent; eyes small, oval. (Europe, Africa and Asia.) ..... Brachymutilla, André. (Type B. gynandromorpha, André.).
4. Mandibles dentate ..... 5.
Mandibles edentate, acute at apex.

Thorax oblong, narrowed posteriorly, rounded in front, the scutellum very minute; eyes small, oval. (North America.)..... Morsyma, Fox.
(Type M. Ashmeadii, Fox.)

5. Thorax not ob-bell-shaped..... .6.
Thorax ob-bell-shaped, widest in front, the pronotum very short, wider than the mesonotum and a little wider than the head.
Head transverse, the temples narrow; ocelli wanting; scutellum present; abdomen spotted with white, the first segment narrowed into a slight petiole at base, but broad at apex and sessile with the second. (Asia, Africa)..... ..... Spilomutilla, Ashm., gen. nov.
(Type Mutilla perfecta, Radoszk.)

6. Thorax oblong, but compressed medially at the sides; head large, quadrate, the temples usually very broad, not oblique; ocelli distinct; scutellum indistinctly differentiated.
(Africa.)..... Viereckia, Ashm., gen. nov.
(Type Mutilla dumbrodia, Péring.)
Thorax oblong, as wide behind as before, or nearly, and only slightly compressed at the sides medially; head obtrapezoidal, the temples oblique; ocelli subobsolete; scutellum entirely absent.
(Africa.)..... Apteromutilla, Ashm., gen. nov.
(Type Mutilla aeda, Péring.)

7. Head large, quadrate, usually much broader than the thorax, the thorax oblong quadrate, the sides parallel, or nearly, the front angles acute; mandibles 3-dentate.
Head armed with a large tooth on each side beneath, the upper hind angles acute; scutellum present; clypeus bidentate; eyes oval, placed anteriorly rather close to the mandibles. (North America.)..... Myrmilloides, André.
(Type Mutilla grandiceps, Blake.)
Head unarmed, the upper hind angles not acute; scutellum present; clypeus not bidentate. (Europe, Africa, Asia.)..... ..... Myrmilla, Wesmael.
(Type Mutilla distincta, Lepel.)

8. Front wings with only *two* cubital cells..... 9.
Front wings with *three* cubital cells, or the third partially formed, never entirely absent..... 11.

9. Not entirely black, the thorax red; head transverse, rounded behind, the hind angles not acute ..... 10.
Entirely black.
Head transverse-quadrate, the hind angles acute; mandibles bidentate ..... Pseudomethoca, Ashmead.
(Type Mutilla Canadensis, Blake.)
Head transverse, rounded behind, the hind angles not acute ..... Dimorphomutilla, Ashm., gen. nov.
(Type Mutilla lunulata, Spinola.)

10. Head transverse, wider than the thorax; mandibles not long: bidentate at apex. (Europe, Africa.) ..... Myrmilla, Wesmael.
Head transverse-quadrate, wider than the thorax; mandibles long, narrow, arcuate, tridentate at apex. (Africa.) .. Labidomilla, André.
(Type Mutilla tauriceps, Kohl.)

11. Mesonotum *with* furrows; hind tibiæ spinous on outer face ..... 12.
Mesonotum *without* furrows; hind tibiæ not spinous on outer face.
Not entirely black, the thorax red; front wings with *two* recurrent nervures; antennal joints 3 and 4 more than twice longer than thick. (Europe.) ..... Myrmilla, Wesmael.
Entirely black; front wings with only *one* recurrent nervure; antennal joints 3 and 4 hardly longer than thick ..... (?) Dimorphomutilla, Ashm. (partim.)

12. Mandibles 3-dentate.
First and second joint of the flagellum not short, fully twice as long as thick. (South America.) ..... Euspinolia, Ashm., g. nov.
(Type Mutilla chilensis, Spinola.)
First and second joints of the flagellum short, the first distinctly shorter than the second. (Africa.) ..... Dasylabroides, André.
(Type Mutilla capensis, Sauss.)

13. Antennæ simple, never flabellate ..... 14.
Antennæ abnormal, flabellate.
Thorax with distinct parapsidal furrows; the scutellum with a deep furrow across the base; front wings with *three* cubital cells. (Africa.) ..... Psammotherma, Latreille.
(Type Mutilla flabellata, Fabr.)

14. Front wings with *three* cubital cells, or the third at least partially formed ..... 15.

Front wings with only *two* cubital cells, the third entirely obliterated..... .24.

15. Scutellum abnormal, conically or triangularly elevated, especially medially at apex..... .....16.

Scutellum normal, not conically or triangularly elevated.....17.

16. Mesonotum with distinct furrows; mandibles excised beneath, bidentate at apex: abdomen with the first ventral segment carinate medially, the hypopygium margined laterally, emarginate at apex. (Africa.).....Trogaspidia, Ashmead.
(Type Mutilla medon, Smith.)

17. Mesonotum *with* distinct parapsidal furrows, or the furrows indicated posteriorly ....18.

Mesonotum *without* parapsidal furrows.....23.

18. Mandibles beneath, before the middle, excised or sinuated, and usually with a process or tooth before the incision.....19.

Mandibles beneath simple, not excised or sinuated, and never with a process or tooth beneath.....21.

19. Mandibles bidentate.....20.

Mandibles tridentate.

Submedian cell longer than the median, the second cubital cell more or less triangular, the third large, hexagonal; first joint of the flagellum shorter than the second. (Europe, Africa, Asia.) ....Mutilla, Linné.
(Type M. europaea, Linné.)

20. Submedian cell longer than the median, rarely equal, the marginal cell about twice as long as wide; first joint of the flagellum about as long as the second; hind tibiæ spinous and also with long hairs. (North and South America.).....Timulla, Ashmead.
(Type Mutilla dubitata, Smith.)

Submedian and median cells equal, the marginal cell not much longer than wide; first joint of the flagellum distinctly shorter than the second; hind tibiæ *not* spinous, but with long hairs.
(Europe.). .....Smicromyrme, Thomson.
(Type Mutilla rufipes, Latr.)

21. Mandibles tridentate.....22.
Mandibles bidentate.
Submedian cell longer than the median; disc of clypeus subconvex; first joint of the flagellum a little shorter than the second; second ventral segment normal. (Europe.).....Ronisia, Costa.
(Type Mutilla brutia, Pet.)

22. Second ventral segment carinate, and sometimes dentate posteriorly (Africa.).....Barymutilla, André.
(Type Mutilla pythia, Smith.)

23. Submedian cell longer than the median, the third cubital cell pentagonal. (Africa.).....(?) Dolichomutilla, Ashmead.

24. Scutellum and metathorax normal, unarmed.....25.
Scutellum and metathorax abnormal, armed with teeth.....27.

25. Thorax with the front margin slightly arcuate, the angles not acute; front wings with *two* recurrent nervures.....26.
Thorax with the frontal margin slightly concave, the angles *acute;* front wings with *one* recurrent nervure.
Head transverse, not as wide as the thorax; mesonotum with distinct furrows; median and submedian cells of an equal length; abdomen with a white band.
(Asia.)..... Radoszkowskius, Ashm., gen. nov.
(Type Mutilla simplicifascia, Radoszk.)

26. Head subquadrate, *with* two tubercles between the antennæ, the temples broad; recurrent nervures converging and entering the second cubital cell close together.
(Africa.).....Blakeius, Ashm., gen. nov.
(Type Mutilla bituberculata, Smith.)
Head transverse, *without* tubercles between the antennæ, the temples not broad; recurrent nervures not converging, widely separated.
(Africa.).....Mimecomutilla, Ashm., gen. nov.
(Type Mutilla purpurata, Smith.)

27. Scutellum transverse-quadrate, *tridentate* posteriorly; second ventral segment armed with a tooth. (Africa.). Péringueya, Ashm., gen. nov.
(Type Mutilla erynnis, Péring.
Scutellum large, flat, *bidentate* posteriorly, a tooth at each hind angle that curves inwardly; second ventral segment normal, unarmed
(Africa.).....Odontomutilla, Ashmead.
(Type Mutilla Saussurei, Sèchel.)

28. Thorax quadrangular, not much narrowed posteriorly, the sides parallel or nearly, sometimes laterally slightly sinuate or compressed medially, rarely obtrapezoidal.....29.

Thorax quite differently shaped, most frequently obpyriform, obovoid, violin-shaped or otherwise, usually narrowed posteriorly or much contracted at the sides.....39.

29. Pygidium not perfectly smooth, usually striate, rugulose, coriaceous or punctate, and with a pygidial area, i.e. with an elevated rim at the sides.....30.

Pygidium usually smooth, without a distinct pygidial area, or the elevated rim is wanting or exceeding delicate.....44.

30. Thorax with the front angles rounded, *not* acute.....31.

Thorax with the front angles acute.....33.

31. Lateral margins of the thorax and the upper margin of the metathoracic truncature dentate or denticulate.....32.

Lateral margins of the thorax and the upper margin of the metathoracic truncature usually simple, not dentate at the most, and rarely with only the upper margin of the truncature dentate....34.

32. Thorax with sides parallel or nearly; head subquadrate, *without* tubercles between the antennæ; mandibles simple, unarmed; first joint of the flagellum obconical, about twice as long as thick, the second joint transverse. (Africa.).....(?) Trogaspidia, Ashmead.

Thorax with side slightly compressed medially; head large, quadrate, *with* two tubercles between the antennæ; mandibles very long, tridentate (two widely-separated teeth within on inner margin); first joint of the flagellum very long, longer than 2 and 3 united. (South America.).....Euspinolia, Ashm., gen. nov.
(Type Mutilla chilensis, Spin.)

33. Head quadrate, a little wider than the thorax, with *two* triangular tubercles between the antennæ. (Africa.). Blakeius, Ashm., gen. nov.
(Type Mutilla bituberculata, Smith.)

Head transverse, not wider than the thorax, *without* tubercles between the antennæ. (Asia.)..Radoszkowskius, Ashm., gen. nov.
(Type Mutilla simplicifascia, Radoszk.)

34. Upper margin of the metathoracic truncature armed with three or more teeth.....35.

Upper margin of the metathoracic truncature normal, unarmed...36.

35. Thorax not twice as long as wide, the upper margin of the truncature armed with 3 to 5 teeth; head large, quadrate, the temples very broad. (Africa.).....Péringueya, Ashm., gen. nov.
(Type Mutilla euterpe, Péring.)

Thorax a little more than twice longer than wide, the upper margin of the truncature armed with about 8 teeth; head subquadrate, the temples not especially broad.
(Africa.).....Pristomutilla, Ashm., gen. nov.
(Type Mutilla pectinata, Radoszk.)

36. Mandibles at apex *not* tridentate.....37.

Mandibles at apex tridentate, the outer tooth the longest. (Europe, Africa, Asia.).....Mutilla, Linné.

37. Mandibles *not* emarginate beneath towards base, *without* a process or projection.....38.

Mandibles emarginate beneath towards base, *with* a process or projection before the emargination. (Europe.)....Ronisia, Costa.
(Type Mutilla brutia, Pet.)

38. Head subquadrate or transverse, not or scarcely wider than the thorax.

Mandibles bidentate; third joint of the antennæ not longer than the fourth, shorter than the fifth, or no longer.
(Europe.).....Smicromyrme, Thomson.

Mandibles acuminate, edentate, rarely with a slight tooth within before apex; third joint of the antennæ longer than the fourth, usually as long as joints 4 and 5 united. (North and South America.).....Timulla, Ashmead.

Head large, quadrate, wider than the thorax, the temples broad; thorax more than twice longer than wide; abdomen with two white dorsal spots on second segment. (Africa.)...Viereckia, Ashmead.

39. Thorax not escutcheon-shaped.....40.

Thorax somewhat escutcheon-shaped, sinuately emarginated or contracted from about the apical one-fourth, the posterior margin and angles rounded; head transverse, as wide as the thorax; eyes oval. (Africa.).....Mimecomutilla, Ashm.

40. Thorax quite differently shaped, *without* a lateral tooth at the apical third.....41.

Thorax sinuate and slightly narrowed posteriorly from a lateral tooth at the apical third.

Mandibles simple, edentate ; third joint of the antennæ obconical, hardly longer than thick at apex.

(Africa.).....Odontomutilla, Ashmead.

41. Thorax not hexagonal, usually obpyriform, obovoid, obtrapezoidal or violin-shaped .....42.

Thorax distinctly hexagonal, widest at the angles a little before the middle, squarely truncate anteriorly.

Head quadrate, the temples broad ; eyes oblong-oval.

(Africa.).....Xenomutilla, Ashm., gen. nov.

(Type Mutilla eurydice, Péring.)

42. Thorax not much elongate, less than thrice as long as wide .....43.

Thorax much elongate, obpyriform, at least thrice as long as wide, or even longer ; pygidium towards apex usually smooth, shining, the pygidial area nearly obliterated.

Thorax more than thrice as long as wide, coarsely pitted or rugose, the front margin rounded, the lateral margin with a triangular tooth before the middle ; second ventral segment with a median tooth ; head subquadrate, hardly as wide as the thorax, rounded behind, the temples broad ; mandibles acuminate at apex, but with a tooth within near the middle, usually not visible when the mandibles are closed.

(Africa.).....Dolichomutilla, Ashmead.

Thorax about thrice as long as wide, but not coarsely sculptured, the front margin squarely truncate, the lateral margins without a tooth ; second ventral segment unarmed ; head transverse, not wider than the thorax, the temples narrow ; mandibles acuminate, edentate. (Asia.) .....Promecilla, André.

(Type Mutilla regia, Smith.)

43. Thorax obpyriform, obovoid or subtrapezoidal, narrowed posteriorly.

Thorax subtrapezoidal ; head subquadrate, rounded behind, the temples broad ; eyes small, oval ; mandibles arcuate, acuminate.

(Africa.).....Brachymutilla, André.

Thorax obovoid or obpyriform.

Head quadrate, the temples broad ; eyes ellipsoidal ; mandibles conically-pointed ; third antennal joint longer than the fourth, but not twice as long as thick. (North America.).....Morsyma, Fox.

Head subglobose; eyes not small, oval or ovate; mandibles stout, conically-pointed; third antennal joint fully twice as long as thick, obconical, longer than the fourth. (Europe, Africa.) ..... Dasylabroides, André.
(Type Mutilla caffræ, Smith.)

44. Thorax more or less contracted at the sides, almost violin-shaped or obtrapezoidal; if somewhat quadangular the sides sinuated.... 45.
Thorax quadangular or nearly, trapezoidal or obpyriform..... 46.

45. Thorax, seen from above, almost violin-shaped.
Head large, quadrate, wider than the thorax, the upper hind angles acute, beneath armed with a tooth on each side; mandibles usually bidentate, rarely simple, the outer tooth the longer. (North America.).. ..... Pseudomethoca, Ashmead.
Head transverse, usually wider than the thorax, but with the hind angles rounded and beneath unarmed; mandibles with a tooth within before apex. (South America.)..... Dimorphomutilla, Ashmead, gen. nov.
(Type Mutilla lunulata, Spin.)
Thorax, seen from above, almost quadangular, with the sides bisinuate or crenulate; head transverse, a little wider than the thorax, the cheeks unarmed; eyes ellipsoidal; mandibles bidentate. (Africa.) ..... Barymutilla, André.
(Type Mutilla pythia, Smith.)

46. Thorax not trapezoidal..... 47.
Thorax trapezoidal, slightly narrowed *anteriorly*.
No median longitudinal carina on thorax, the lateral margins finely denticulate; head large, nearly quadrate, wider than the thorax; eyes oval; hind tibiæ spinous; scape long, somewhat curved; first joint of the flagellum very long, three or more times longer than the second; tarsi long and slender; mandibles large, falcate. (Africa.) ..... Labidomilla, André.
A feeble median longitudinal carina on thorax, the lateral margins not acute, the hind angles acute; head oblong, longer than wide; eyes oval; middle and hind tibiæ smooth, not spinous. (Europe, Asia, Africa.)..... Nanomutilla, André.
(Type Mutilla voucheri, Turn.)

47. Thorax quadrangular or nearly, the sides parallel or nearly, rarely much compressed or sinuate at sides medially ..... 48.

Thorax obpyriform or much narrowed posteriorly.....52.

48. Thorax quadrangular or nearly .....49.

Thorax about twice as long as wide, the sides more or less compressed or sinuate medially.

Head not wider than the thorax; abdomen ovate, subsessile, the second segment large, with two white spots.

(Africa.) .....Apteromutilla, Ashmead.

50. Head somewhat large, but without a tooth on each side beneath, the hind angles rounded, not acute; eyes oval or oblong; antennal scape not specially long .....51.

Head large, with a tooth on each side beneath, the hind angles acute; eyes oval; antennæ rather widely separated, the scape long, the third joint very long; mandibles long, narrow, arcuate and bidentate at apex. (North America.).....Myrmilloides, André.

51. Mandibles 3-dentate; third antennal joint only about twice as long as the fourth, or as long as joints 4 and 5 united. (Europe, Africa, Asia.).....Myrmilla, Wesmael.

Mandibles acuminate at apex, with a tooth within before apex, never tridentate; third antennal joint more than twice longer than the fourth. (Europe, Africa.).....Edrionotus, Radoszkowski.

(Type Mutilla capitata, Lucas.)

52. Head not wider than the thorax, strongly concave beneath, the margins rimmed; second abdominal segment anteriorly depressed, the depression limited by an oblong cushion.

(Asia.).....Platymutilla, André.

(Type P. quinquefasciata, André.)

A NEW JOINT-WORM PARASITE FROM RUSSIA.

BY WILLIAM H. ASHMEAD, M.A., D.SC., WASHINGTON, D. C.

Homoporus Vassiliefi, sp. nov.—♀—Length, 2 mm. Head and thorax bluish, finely, closely punctured, the face and the pleura with a greenish metallic lustre, the metapleura decidedly brassy; antennæ brown, the scape yellow; legs concolorous with the thorax, the hind coxæ with a metallic greenish fringe, the apices of all femora, all tibiæ and tarsi, except the last joint, yellow, the last joint dark fuscous; wings hyaline, the nervures brown, the stigmal vein two-thirds the length of the marginal, the

postmarginal vein very nearly as long as the marginal ; abdomen aeneous black, tinged with metallic green basally at the sides, ovate, somewhat pointed at apex, very little longer than the thorax.

Type.—Cat. No. 1010, U. S. N. M.

Host.—Hym.: *Isosoma eremitum*, Portschinsky.

Hab.—Oufa, Russia. Described from a single specimen, received from Mr. Ivan Vassilief, of St. Petersburg.

Two of the Russian joint-worms described by Portschinsky, namely, *Isosoma apterum* and *I. eremitum*, should be relegated to the genus *Philachyra*, Haliday.

CONCERNING GASTROPHILUS EPILEPSALIS, FRENCH.

Mr. Washburn's note in the November number (p. 320) induces me to state that *Gastrophilus epilepsalis*, French, is no *Gastrophilus* at all : in fact, not the larva of an Œstrid. The figure shows that it is a Muscid larva, very probably of *Calliphora*, certainly so if the figure is correct. The species cannot be identified until more of these forms are reared. French's figure indicates that it is very close to the European *C. vomitoria* as figured by Piepers. There is no definite character known to identify Œstrid larvæ, but the larvæ of some Muscidæ can be separated from the Œstridæ. The larvæ of *Calliphora* differ somewhat in the structure of the mouth from any known Œstrid larvæ. That Prof. Washburn had a *Gastrophilus* is quite possible from the habits ; but it is not the *G. epilepsalis*, French.

NATHAN BANKS.

CORRESPONDENCE.

SIR,—Please insert the following addition to my paper on Isodontia, published in the CANADIAN ENTOMOLOGIST for October, 1903 (p. 271) :

Isodontia macrocephala, var. *cinerea*. Described from four specimens taken at Enterprise, Fla.; Columbia, S.C.; Texas, and one without locality. These cotypes are in the collections of the U. S. National Museum, American Entomological Society, Mass. Agricultural College, and Dr. W. H. Ashmead, the collections from which I received them.

H. T. FERNALD.

SOME NEBRASKA BEES.

BY J. C. CRAWFORD, JR., WEST POINT, NEBR.

Melissodes brevicornis, Cress.—Lincoln, Aug. 12–27, on *Teucrium Canadense*. The ♀ differs from the ♂ only in having the face-parts black, pubescence on face lighter, segments 2 to 4 only banded; the scopa is yellowish. The ♂ ♂ taken all had the tibiæ and tarsi entirely fulvous.

Nomada grindeliæ, Ckll.—♀. Head and thorax black, shiny, very sparsely punctured; abdomen red, very sparsely and finely punctured; face covered with decumbent, silvery-white pubescence; mandibles and labrum apically ferruginous; antennæ ferruginous beneath; mesothorax almost impunctate medially; scutellum sub-bilobate; pleura of mesothorax swollen, whole thorax with white pubescence, especially pleura and metathorax; form more robust than in ♂. Length 7 mm.

♂.—The posterior femora have a small tooth beneath, toward base.

Common at Lincoln in August; taken on *Solidago Missouriensis*, *Grindelia squarrosa*; *Euphorbia* and *Lactuca*.

Mr. Pierce informs me that it is probably a parasite of *Halictus ligatus*, Say.

Stelis lateralis, Cress.—West Point, June 10, '01. Taken at the holes of *Alcidamea simplex* in rose bushes.

Neopasites Illinoiensis, Robt.—Lincoln and West Point, Sept. 4 to 11, on *Solidago rigida* and *Grindelia squarrosa*.

N. heliopsis, Robt.—West Point and Lincoln, Aug. 30 to Sept. 11, on *Aster*, *S. rigida* and *G. squarrosa*.

Halictoides marginatus, Cress.—Common at Lincoln and West Point in August and September; found on *Grindelia*, *Helianthus*, *Solidago*, *Teucrium*, *Bidens*.

H. maurus, Cress.—Sioux Co., June, on Campanula. Mr. Viereck, to whom this was sent for comparison with Mr. Cresson's types, informs me that the types are all males, and not females, as stated in the original description.

Perdita maura, Ckll.—Many specimens from both Lincoln and West Point, but all on *Physalis*. Dr. Graenicher writes that he has found it burrowing in loamy soil at Milwaukee, Wis., and regards it as an oligotropic visitor of *Physalis*. Prof. Cockerell writes that it may possibly be found on Aster growing in the vicinity of *Physalis*, and no doubt this was the case in the type material.

The abdominal segments 2 and 3 or 2–4 have a small white spot on each side.

P. zebrata, Cress.—Scott's Bluffs, Aug. 14, 1901, on *Cleome*. New to Nebraska.

Panurginus Piercei, n. sp.—♂. Black, head closely and rather coarsely punctured above antennæ, sparsely so below; scape of antennæ black, coarsely punctured in front; flagellum dark; clypeus, labrum, base of mandibles, lateral face-marks nearly as high as insertion of antennæ and broad above, dog's-ear marks, supra-clypeal area, all tarsi, anterior tibiæ in front, spot at apex of femora in front, base and apex of all tibiæ, yellow; pubescence of head and thorax rufo-ochraceous, dense on thorax; thorax rather coarsely and sparsely punctured; wings dusky, more so at apex; nervures and stigma dark; tegulæ testacous; metathorax roughened, the base irregularly rugose; base of first abdominal segment impunctate, the disc punctured; all the other segments densely and strongly punctured, apical margins broadly depressed, shiny and transversely lineolate; depressed margins at sides and apical segments all over with thin whitish hairs; margin of clypeus and of process of labrum black; clypeus with a median impunctate area, in the middle of which is a longitudinal depressed line not quite reaching apex of clypeus.

Length 8 mm.

♀.—Similar, form broader, punctuation finer; yellow confined to spots on four anterior knees: clypeus without impunctate area and depressed line; process of labrum trapezoidal, base much wider than apex, slightly emarginate; wings almost hyaline, nervures testaceous, but stigma dark; first abdominal segment impunctate, lineolation plainer than in the ♂; narrow apical margins of segments testaceous; segments not so plainly depressed; fimbria and scopa whitish.

Length 8–9 mm.

A pair from nest, Lincoln, Nebr., Sept. 7, 1903 (W. D. Pierce, coll.); also six other ♀♀ (not from nests); a ♂ West Point, Nebr., Sept. 12, 1903, on Bidens (Crawford, coll.).

Dedicated to Mr. Pierce, who first found the species, in recognition of his work on the habits and parasites of bees.

Differs from *P. rudbeckiæ* in its larger size, dark tubercles, presence of dog's-ear marks, clypeus ♂ with depressed median line, instead of "a broad median depression, which is impunctate or nearly so."

Panurginus Nebrascensis, n. sp.—♂. Black shining labrum, base of mandibles, clypeus, lateral face-marks as high as insertion of antennæ,

supra-clypeal and dog's-ear marks, a line in front of scape of antennæ, spot on tubercles, knees, front tibiæ except black line on rear, base and apex of intermediate and rear tibiæ, and all tarsi, lemon-yellow; face with sparse large punctures as high as antennæ, above this closely and more finely punctured; vertex and head behind eyes with sparse, large and deep punctures; pubescence of head and thorax sparse, whitish; mesothorax with rather large but not close punctures; scutellum with coarse punctures; postscutellum closely and more finely punctured; base of metathorax enclosed, longitudinally striate; truncation and sides dull from fine, close punctures; sides of mesothorax shiny, and with coarser and sparser punctures; tegulæ testaceous; wings dusky, darker apically; base of abdominal segment smooth, beyond with rather close punctures; apices of segments depressed and transversely striatulate; segments beyond first closely and finely punctured, abdominal segments clothed with very short yellowish pubescence, visible only in certain lights.

♀.—Similar, but lacking yellow marks of male; mesothorax more finely and sparsely punctured; punctures of truncation of metathorax of pleura finer; first abdominal segment almost impunctate; abdomen lacking the pubescence of ♂; anal fringe reddish; scopa whitish.

Lincoln and West Point, Nebr.: on *Solidago rigida* and *S. Missouriensis*, and also *Grindelia squarrosa*. Aug. 24 to Sept. 11. 20 ♂'s, 8 ♀'s. Sexes in copula.

Andrena Aliciæ, Robt.—A single specimen on *Bidens chrysanthemoides*, Sept 19, 1903, at West Point. New to Nebr.

Our other fall *Andrenas* are *pulchella*, *helianthi*, *solidaginis*, *nubecula* and two apparently undescribed species.

Sphecodogastra Texana, Cress.—Lincoln, Sept.; on *Grindelia;* West Point, Oct.

Halictus aberrans, n. sp.—♀. Black, shiny, with thin pubescence; head finely and closely punctured; thorax rather sparsely and finely punctured; clypeus sparsely punctured; antennæ dark; tegulæ black, externally honey coloured; wings slightly milky and nervures honey colour; legs black, with a very thin loose scopa of silvery-white hairs; base of metathorax finely irregularly wrinkled; abdomen very shiny, finely and sparsely punctured, punctures more dense toward bases of segments, margins of segments light testaceous, and with bands of white hair on segments one to four.

Length about 9 mm.

Three specimens: Sioux Co., Nebr., June 3, on *Symphoricarpos;* Crawford, Nebr., July 28, on *Cleome;* Manitou, Colo.

A NEW GENUS OF BEES.

BY J. C. CRAWFORD, JR., WEST POINT, NEBR.

Protandrenopsis, new genus.—Labial palpi four-jointed, 1 about twice as long as 2–4 together, 2–4 slightly decreasing in length; maxillary palpi 6-jointed, 1 and 2 subequal, longer than any of the following joints; 3, 5 and 6 subequal, 4 slightly longer; tongue long, lanceolate; mandibles simple; labrum transverse, process of labrum large, almost covering labrum; foveæ present, small; stigma large, well developed, nearly two-thirds the length of the obliquely truncate, subappendiculate marginal cell, which is about as long as the two submarginals together; second submarginal fully one-third longer than the first, receiving the first recurrent nervure about one-third from base and the second near apex; median cell along the median nervure, a little longer than the submedian, the transverse median nervure joining the median just before the origin of the basal nervure; scopa on posterior tibiæ, first joint of tarsi and on venter.

Type, the following species:

Protandrenopsis fuscipennis, n. sp. ♀.—Black, somewhat shining, almost entirely nude, the pubescence being confined to the golden-yellowish anal fringe and scopa on legs, a little inconspicuous pubescence around insertion of antennæ and on vertex, a line on prothorax passing around behind tubercles, some yellowish pubescence on rear of head, on under side of insect and a few plumose hairs at extreme side of abdominal segments; all pubescence inconspicuous and not showing from above, except fimbria and scopa; head closely and rather coarsely punctured, more coarsely so on sides of face; process of labrum very large, concave, the anterior margin bent upwards, process smooth and shining, basally a little roughened and with a median ridge, apically subemarginate; rest of labrum covered with yellowish pubescence; foveæ narrow, short, deep, the lower end nearer eye than the upper; mandibles black, obscurely reddish medially; mesothorax coarsely and rather sparsely punctate, the pleura confluently so; sides of metathorax finely roughened, the truncation closely and finely punctate, becoming sparse and coarse at top, laterally; base of metathorax narrow, rounded behind and bounded by a carina; behind this an impunctate space; enclosed base with coarse, quite regular rugæ, almost what is called a transverse row of shallow pits in the genus *Colletes;* wings very deeply infuscated; nervures and stigma blackish; tegulæ black anteriorly, dark testaceous

posteriorly; legs black, *anterior coxæ each with a long pubescent spine on the inside behind trochanters*, anterior and middle knees with a yellow spot, their femora thickened and keel-shaped beneath; inner spur of hind tibiæ finely serrate; scopa golden-yellowish, more reddish on tarsi, first joint of hind tarsi produced to a free apex reaching tip of second joint; abdomen coarsely and rather closely punctate, the apical margins of segments 1–4 broadly depressed, shining, somewhat lineolate; at sides of segment 2 a small, oval, depressed spot; the part of the segment covered by the preceding segment is finely lineolate and the posterior margin finely punctured; this covered portion produced at each side of segments 2–4 as a finely-punctured triangle with the apex posterior; venter black, apical half of segments closely punctured, scopa yellowish.

Length 10 mm.

Two specimens collected by the author at West Point, Nebr., Sept. 18 and 20, 1903, on *Bidens chrysanthemoides*.

♂ unknown.

The intense black colour, unrelieved by any pubescence, and the very dark wings, make this a conspicuous insect. Viewed from above, it is all black except the fimbria and scopa on legs.

The generic name is given on account of the similarity to *Protandrena* in venation, in facial characters and general characteristics. It has a very different tongue, however.

In Ashmead's table this would run to *Panurgidæ* to number 6, but differs from either division under that in having the second submarginal much longer than the first. It is, I consider, a long-tongued *Andrenid* with but two submarginals, more closely related to *Protandrena* than any other genus, but the tongue about as in *Panurginus*, which genus, it is interesting to note, has similar foveæ, and a large species of which would look very similar to *Protandrenopsis* ♀. From the yellow knees of *fuscipennis* ♀ I should imagine that the ♂ has more or less yellow on the face.

Dr. L. O. Howard, Chief Entomologist of the Department of Agriculture, Washington, delivered at Toronto, on Saturday, November 7th, a lecture on "Some International Work with Insects." It was given under the auspices of the Canadian Institute, in the new medical building of the Toronto University, and was the first of a series provided for by a gift from Sir Sandford Fleming. The lecture attracted much attention, and long reports of it were given in the Toronto daily papers on the Monday following.

MISCELLANEOUS ENTOMOLOGICAL NOTES.

BY H. H. LYMAN, MONTREAL.

There must be many facts known to entomologists which, though not sufficiently important to work up into an article for the entomological magazines, are still of much interest, and worthy of publication, and I would like to suggest that a page or part of a page at the end of each number of the "CANADIAN ENTOMOLOGIST" be set aside for this purpose, and that correspondents be invited to send brief notes of rare captures or other interesting items.*

NEMEOPHILA SCUDDERI, Pack.

In July, 1890, when at Nepigon, I obtained eggs of this species, which had been described by the late Henry Edwards under the name *Selwynii*,† and carried the larvæ through to imago, and in CAN. ENT., XXV., 248, published a paper on the preparatory stages of this species. On account of my rapid travelling across the continent and back again to Montreal, and being much occupied in collecting Lepidoptera and plants, sight-seeing and photographing, I was not able to give these larvæ very close attention, and was afraid that I had missed some of the moults, but as Dr. Fletcher expressed the opinion that if I had descriptions of four moults, that was probably all there were, I ventured to publish my notes; but in 1895 Dr. Fletcher kindly sent me a moth and 12 eggs of the form found at Olds, N.-W. T. These I failed to carry to imago, but carried two past 7th moult, and so found that my previous observations had been inadequate. In 1902 I was again indebted to Dr. Fletcher for eggs from Banff, and carried seven to imago, getting some nice variations, but as I was exceedingly busy, and knew that Dr. Fletcher and Mr. Gibson were also rearing the species, I did not take any further notes.

EGG OF ALBUNA TORVA, Hy. Edw.

A female of this species having been captured on a flower by one of those present at the excursion of the Montreal Branch of the Ent. Soc. Ont., to St. Adele, Q., on 6th June, 1896, the writer secured it and obtained about 55 eggs, which were laid loose and all at once.

Length, .875 mm.; width, .625 mm.

Rather almond shaped, or somewhat like a hen's egg, except that the transverse section would be oval. Perfectly smooth and shining. Light

*The Editor will always be pleased to receive notes of this kind for publication.

†In Dyar's Catalogue this name is erroneously credited to Neumoegen.

brown in colour. On 14th June, eight days after being laid, they appeared to be shrivelling as though infertile. They, however, hatched on 20th June. Egg period 14 days.

Egg and Young Larva of Hepialus Argenteomaculatus, Harris.

Laid on 15th July, 1896. Length, .75 mm.; width, .58 mm.

Rather even oval. Smooth, under a ⅔-inch objective seen to be very slightly roughened.

White when laid, soon turning black.

Hatched about 7th August. Egg period about 23 days.

Length, 1.75 mm. Head rather large, it and the plate on first thoracic segment dark brown. Body slender, creamy white, with simple setæ as long as or longer than the diameter of the body.

Papilio Brevicauda, Saunders.

At the annual meeting in 1898, Mr. Winn read a paper on this species, and Dr. Fyles, in commenting on it, as reported on p. 38 of the 29th Annual Report, stated that he had found the larvæ hard to please. He did not mention whether he had tried parsley.

I never had so large a percentage of success with any other species. I received that year, from Mr. D. Brainerd, two eggs out of five which Mr. Winn sent him, which duly hatched, and I carried both larvæ through to imago without the least difficulty. I took them with me to the meeting of the A. A. A. S. in Boston, and afterwards to Prout's Neck, Me. At Prout's Neck I found an umbelliferous plant which they preferred to parsley, though when I returned home I fed them on parsley again. Both imagos are now in my collection.

Thecla Titus, Fabr.

A fine female was taken in 1896, probably in August, and confined with wild cherry. Five eggs were laid, three on the leaves near the edge and two on the twig, one on each side of the base of a leaf petiole.

The egg is round, Sea Urchin shape; 1 mm. in diameter. The projections are coarser, and much closer together than shown in Scudder's Fig. 11, Plate 65. One was pale yellow, the others considerably tinged with orange.

In the spring all the eggs were found to be more or less chipped at the micropyle; one had the whole micropyle bitten out, and the larva could be seen inside the shell, but it was apparently dead, as there was no movement, and none succeeded in getting out.

I have had the same trouble with the eggs of *Lycæna Scudderii**,

*Can. Ent., XXXIV., 127.

and do not know how to account for it, unless it be that these eggs with thick shells and heavy sculpture, in which these species pass the winter, require to be softened by the carbonic acid washed down by the rain before the young larva can eat its way out.

THE AUTHORSHIP OF PSEUDANARTA.

BY THE LATE A. RADCLIFFE GROTE, HILDESHEIM, GERMANY.

[In our September number, page 257, the late Professor Grote, in his "Corrections and Notes on Dr. Dyar's List of Noctuids," stated :

"124. As I have shown in these pages, the citation to *Pseudanarta* of Hy. Edwards is spurious." At the time he wrote these words he had sent us the following paper, and supposed that it would have been published before these "Corrections" appeared.—Ed. C. E.]

The history of the generic term Pseudanarta is as follows :

1878. Grote, Bull. U. S. Geol. Surv. 178 : *crocea* (flava) sole species, and therefore type.

1882. Grote, New Check List, New York, 27 : flava, var. crocea, singula, flavidens, aurea. The genus is credited without citation to Hy. Edwards, under the mistaken idea, derived from a previous correspondence, that this writer had used or described the genus. The name *Pseudanarta* was originally proposed in letters by Grote for Edwards's *Anarta crocea*, in which the eyes are naked, the tibiæ unarmed, and which is, in reality, as originally stated by Grote, allied to Hadena, Led., *nec* Schrank.

1889. J. B. Smith, Ent. Amer., V., 175 : falcata, aurea, flava (crocea), singula, flavidens. The citation to Hy. Edwards is now supplied and reference is made to : "Proc. Cal. Ac. Sci., Vol. 6, p. 133, 1875." But this page contains the original description of *Anarta crocea*, and no mention is there made of Pseudanarta. This specific description refers to what is only a probable variety of the previously described *Hadena flava*, Grote. After examination of the communications of Hy. Edwards to the California Academy : "Pacific Coast Lepidoptera, Nos. 1 to 22" (all published), no mention of Pseudanarta is found in any one of them. This citation by Prof. Smith in 1889 justified the subsequent use of Hy. Edwards's name as author in the absence of a verification. The erroneous citation is twice repeated in the Washington Catalogue, p. 148, and must have been made without consulting the text. It was probably supplied to support Grote's incorrect use of Hy. Edwards's name as authority for *Pseudanarta* in the first instance.

NOTES ON THE ENTOMOLOGY OF PECOS, NEW MEXICO.

BY T. D. A. COCKERELL, COLORADO SPRINGS, COLO.

1. *Two bees with unexpected habits.*

Halictus galpinsiæ, n. sp.

Halictus amicus, var. *a*, Ckll., An. Mag. Nat. Hist., Jan., 1901, p. 126.

A single specimen was collected one evening at Las Vegas, at a flower of *Gaura coccinea*. I then remarked of it: "Face narrower than type; possibly a distinct species." It seemed strange that it should be visiting the *Gaura*, but it did not occur to me that I had a genuinely vespertine bee. On June 22, 1903, at Pecos, I was astonished to see a number of bees busily collecting pollen from the flowers of *Galpinsia fendleri* (a large yellow evening primrose) after sunset, at 7.30 p. m. I collected some, and found that they were my "*Halictus amicus*, var. *a*," which is evidently a distinct species. It is readily known from *H. amicus* by the narrower face and more sparsely punctured clypeus. It belongs to Robertson's genus *Evylaeus*, and is distinguished from the species in his table by the following combination of characters: Abdomen pruinose with white hair, the thin pubescent fasciæ entire; first segment shining, distinctly but minutely punctured; hind spur of hind tibia with five teeth, the basal three very long; enclosure of metathorax minutely cancellate, semi-lunar, concave, with a raised rim; stigma large, reddish-honey-colour. The scape is very long; flagellum dark, faintly brownish beneath at the end. The type specimen is from Pecos.

Halictus ovaliceps, Ckll., 1898.

Pecos, N. M., at flowers of *Castilleia integra*, June 23 and 24 (*W. P. Cockerell.*)

This peculiar bee was known only by a single example, taken at Santa Fé. My wife has rediscovered it, and has ascertained that it habitually visits the *Castilleia*, which has not been considered a bee-flower at all. (Compare Robertson, Trans. St. Louis Acad., 1891, p. 598.)

2. *A new Aphid on Lonicera.*

Rhopalosiphum Grabhami, n. sp.

♀.—Winged form: Spread of wings 8¼ mm., length of body about 2 mm., of antennæ about 2 mm.; measurements in μ: Antennal joints (1) 90, (2) 60, (3) 670, (4) 430, (5) 360, (6a) 120, (6b) 650; marginal cell about 850 long; radius 3 to branch (radius 1+2) 800, cauda

broad and thick, about 220 long, 330 broad; nectaries about 350 long, strongly swollen in the middle. Body entirely shining dark olive-brown, without markings; legs whitish, suffused with gray, apical portion of femora darkened; antennæ pale; wings hyaline, including veins; beak short, reaching only about half way to middle coxæ; frontal tubercles very distinct; third and fourth antennal joints with very numerous sensoria, over 30 visible in one view on third, 17 in a row on under side, where they are most numerous.

Pupa with abdomen purplish; immature forms show very minute tubercles on abdomen.

Larva dark green; abdomen more or less tuberculate.

Hab.—Pecos, N. M., June 7, 1903 (Dr. M. Grabham). On *Lonicera involucrata*, curling the leaves, the affected parts of which become deep crimson above, the veins white. The first stage of change consists of greenish-yellow spots, which give way to crimson. The effect on the plant is very like that of *Rhopalosiphum ribis* on *Ribes*.

A NEW NORTH AMERICAN CATOCALA.

Professor N. J. Kusnezov, of St. Petersburg, Russia, has recently described a new Catocala from Texas, with four figures. A reprint of the description of the species may be of interest to American collectors, hence I reproduce it below:

"*Catocala orba*, Kusnezov.—Expanse of male 48 mm; size of *C. Judith*, Strecker.

"Antennæ of male ciliate, gray, scaled above, with slight tuftings of hair below. (Palpi broken off.) Front densely covered with whitish-gray hairs. Patagia and front parts of tegulæ and mesothorax dark brown; vertex gray; the rest of tegulæ, nota, and crest on metathorax, whitish-gray. Upper part, sides and crests of the abdominal somites dark gray; anal tuft long, dark gray, lighter below. Thorax on the under side and femora thickly clothed with long, dirty white hairs and scales. (Fore tibiæ broken off.) Middle and hind tibiæ and tarsi gray, spotted and ringed with black. First pair of spurs of hind tibiæ very long and acute.

"Fore wings on the upper side pale gray (resembling somewhat the colour of fresh specimens of *C. concumbens*, Walker), greatly suffused on costa and at base of wings with white scales; darker in terminal area. Transverse lines visible, but very indistinct. Basal line fine, angulated;

basal dash absent. T. a. line forms a brown spot on the whitish costa and two dentations below it; the rest indistinct. Median space with a dark spot in the middle of costa, running into the reniform. T. p. line visible in its upper part alone, beginning with a dark spot on the white costa and forming two subequal dentations, filled inwardly with black; the rest indistinct. Subreniform absent. Reniform dark gray, edged with pure white. Subterminal waved line distinct, whitish, separated from the t. p. line by a light brownish irregular shade. Marginal lunules very small, almost wanting. Cilia uniformly gray.

"Hind wings on the upper side black, base covered by brownish-gray hairs. Cilia at apex dirty whitish, the rest dark gray.

"Ground colour of wings on the under side black; fasciæ very indistinct.

"Fore wings: base dark grayish-black, basal fascia absent; post-medial and subapical ones visible, more or less regularly excurved; between them, at costa, a large pure white spot; apex triangular, white, suffused with isolated gray scales. Cilia white, with dark streaks from extremities of veins.

"Hind wings dark grayish-black, a little lighter at base and costa; median fascia hardly visible, highly excurved at vein 3, thus forming a right-angle. Cilia light gray, with darker median stripe, at apex whitish.

"*Catocala orba* belonged to the black-winged group of the genus, and resembles *C. Judith*, Strecker, and its variety, *miranda*, H. Edw., but is not intimately allied to them, I believe."

Here Prof. Kusnezov gives in detail points of difference between *C. orba* and the two named allied forms, which it does not seem necessary to repeat. I would add that from a casual glance at the figures the upper surface reminds one of *C. Robinsonii*, though smaller and with a different fringe to hind wings: and the under side is entirely different.

G. H. French, Carbondale, Ill.

BOOK NOTICE.

Record of My Life Work in Entomology, by C. R. Osten Sacken, Cambridge, Mass.: 1903; pp. 204.

We desire to thank Baron Osten Sacken very heartily for sending us a copy of his autobiographical memoirs, which we have read with absorbing interest. To us who enjoyed his friendship or acquaintance more than a quarter of a century ago, these reminiscenses of the leading

Entomologists of our earlier days, including the author himself, bring back the past very vividly and recall many events that had almost passed into oblivion.

The Baron divides the record of his life into three periods, each of almost equal length. He was born in St. Petersburg, on the 21st of August, 1828, and began to take an interest in entomology at the early age of eleven. When twenty-one he entered into the service of the Imperial Foreign Office. During this period he collected all orders of insects except Lepidoptera, and published two papers on Tipulidæ, and a pamphlet of 166 pages, in Russian, contained a general survey of the insect fauna of the environs of St. Petersburg.

The second period of his career embraces the twenty-one years spent in the United States (1856–1877), during which he was Secretary of the Russian Legation, and afterwards Consul General of Russia in New York. In 1871 he resigned his official position and made several visits to Europe; for the last four years he lived as a private citizen in the United States. This was the period of his greatest scientific activity, and was made memorable by the preparation and publication of his well-known works on North American Diptera, which paved the way for all subsequent students of this order.

A great part of his time, he tells us, was taken up "in acting as a purveyor of material for Dr. H. Loew to work upon, and as a translator and editor of his manuscripts," which were published by the Smithsonian Institution. These volumes evidently owe a great deal of their value to Baron Osten Sacken's careful work, without which, indeed, they could never have been fitted for publication. His own earliest work in America was his Catalogue of the described Diptera, which was published by the Smithsonian Institution in 1858, and was the third of its long series of entomological works, which have been such a priceless boon to all students in this department of national science. Twenty years later, after doing more than any other person to advance the knowledge of North American Diptera by his collections, researches and publications, he concluded his labours on this side of the Atlantic by the issue of a second Catalogue, a critical one, of the order; this also was published by the same Institution.

The third period of his life, which, we trust, may not be closed for many years to come, has been spent almost entirely at Heidelberg, in Germany. His first proceeding was to go to Guben, the residence of

Loew, now an old and broken-down man, and arrange for the packing and transmittal of the magnificent collection of North American Diptera which had been accumulated there, to the Museum at Cambridge, Massachusetts. It contained the original types of all the species described by Loew, about 1,300 in number, and about 1,600 other species. Most, if not all, of these specimens had been sent to Loew by the Baron, with the distinct understanding that they were eventually to be returned to the United States. It may be mentioned that Dr. Loew was well paid for all his services, and that this invaluable collection reached its destination in safety. After accomplishing this task, which, under all the circumstances, was no easy one, the Baron settled down at Heidelberg and continued his studies and researches, extending his field of observation to all parts of the world, and publishing a long series of notable essays and papers as the years went by.

The present "Record" consists of two parts; the first contains a brief introductory sketch of the author's life; the second, which is very much longer, is composed of "twenty-four chapters on historical, biographical, critical and purely entomological subjects connected with his work"; the third part, not yet published, will contain a complete list of all his publications. The most interesting feature of the second part, to one who is not a Dipterist, is the author's description of many notable Entomologists with whom he was more or less intimately associated. Chief among these was Dr. H. Loew, with whom he was in constant correspondence for over twenty years, and in whose work he took so large and important a share. This is somewhat painful reading, inasmuch as Loew seems to have been largely affected by selfish motives and jealousy of others, and to have lacked the straightforwardness and candour that might have been looked for in so eminent a man; at the same time the author closes his account by stating that he is "entitled to a place, not only among the heroes, but also among the martyrs of science."

The briefer notices of others are very delightful, namely, of Kennicott, Walsh, Bassett, Le Baron and Hagen, among American Entomologists, and of Haliday, Winnertz, Zeller, Rondani and others of European fame. Portraits are given of Haliday and Loew, and a facsimile of the marvellously minute caligraphy of the latter, showing 132 lines of written matter on an ordinary sheet of foolscap paper!

In this "Record of His Life" Baron Osten Sacken has certainly given us a volume of very great interest and also of much historical value. From its pages one learns to appreciate more than ever the excellence of the author's scientific work and the unselfish spirit in which he ever devoted himself to it. As he truly says: "The best part of my work is that which has assisted and stimulated the work of others, and I am conscious at the same time that *that* part of my work is the largest."

Mailed December 4th, 1903.

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ERRATUM.

Page 251, line 3, for Alemedensis read *Alamedensis*.

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The Canadian entomologist

Call no. QL 461 C24
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